

# UNIVERSIDAD MARIANO GÁLVEZ DE GUATEMALA



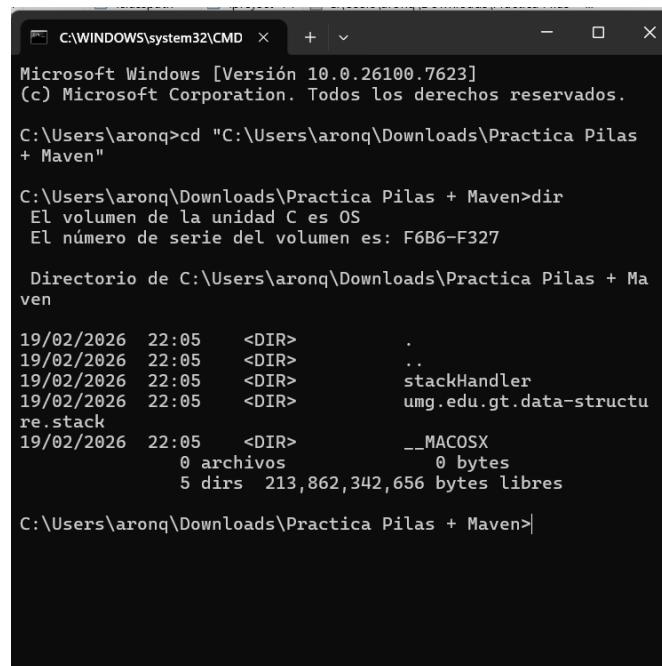
PROGRAMACIÓN 3  
FEBRERO 2026

## DESCARGAR EL ZIP Y EXTRAER TODO LO QUE CONTIENE EN EL

Nombre	Fecha de modificación	Tipo
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
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>
```

Limpie el proyecto

Descargue dependencias

Compile el código

Compile y ejecute pruebas

Genere los archivos en la carpeta target

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack>mvn clean install
[INFO] Scanning for projects...
[INFO]
[INFO] ---< umg.edu.gt.data-structure:umg.edu.gt.data-structure.stack >-----
[INFO] Building umg.edu.gt.data-structure.stack 0.0.3-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ umg.edu.gt.data-structure.stack ---
Downloading from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.6/commons-io-2.6.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-shared-utils/3.3.4/maven-shared-utils-3.3.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.6/commons-io-2.6.jar (215 kB at 172 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-shared-utils/3.3.4/maven-shared-utils-3.3.4.jar (153 kB at 122 kB/s)
[INFO] Deleting C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack\target
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ umg.edu.gt.data-structure.stack ---
[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] Copying 0 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ umg.edu.gt.data-structure.stack ---
[INFO] Recompiling the module because of changed source code.
[WARNING] File encoding has not been set, using platform encoding windows-1252, i.e. build is platform dependent!
[INFO] Compiling 4 source files with javac [debug target 1.8] to target\classes
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ umg.edu.gt.data-structure.stack ---
[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] Copying 0 resource from src\test\resources to target\test-classes
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ umg.edu.gt.data-structure.stack ---
[INFO] Recompiling the module because of changed dependency.
[WARNING] File encoding has not been set, using platform encoding windows-1252, i.e. build is platform dependent!
[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/maven-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)
```

```
[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/maven-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.

```
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
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]
[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] -----
```

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
```

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)
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
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)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-artifact-transfer/0.13.1/maven-artifact-tr
ansfer-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 a
t 133 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-component-annotations/2.0.0/plexus-component-a
nnnotations-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)
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
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-component-annotations/2.0.0/plexus-component-an
nnotations-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-a
rtifact-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-tr
ansfer-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 stackH
andler-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
```

solucioné 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/shared/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  
  
20/02/2026 00:10 <DIR> .  
20/02/2026 00:10 <DIR> ..  
20/02/2026 00:10 <DIR> classes  
20/02/2026 00:10 <DIR> generated-sources  
20/02/2026 00:10 <DIR> generated-test-sources  
20/02/2026 00:10 <DIR> maven-archiver  
20/02/2026 00:10 <DIR> maven-status  
20/02/2026 00:10 3,431 original-stackHandler-0.0.1-SNAPSHOT.jar  
20/02/2026 00:10 9,074 stackHandler-0.0.1-SNAPSHOT.jar  
20/02/2026 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>
```

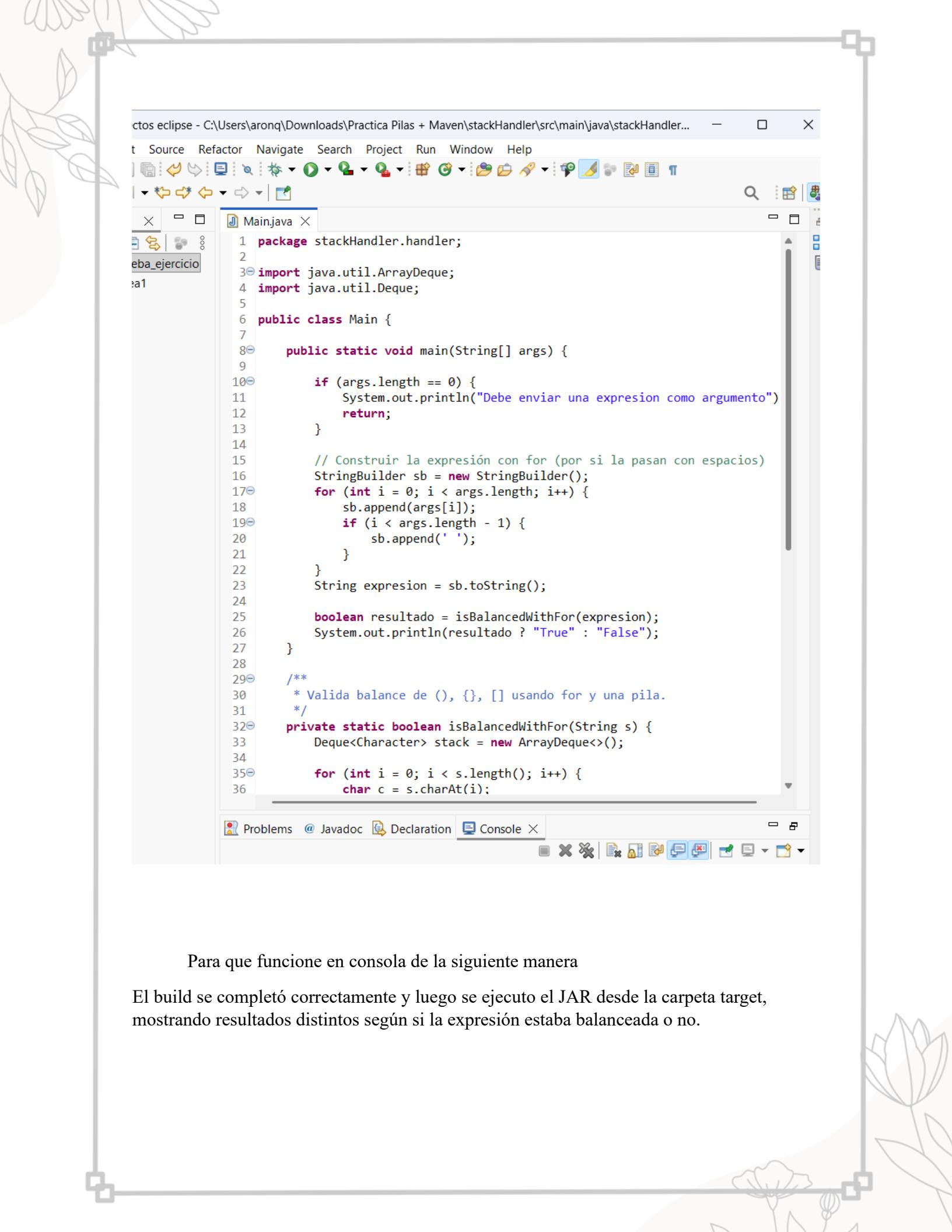
### Caso

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)"  
Tamanio? 3  
Peek: C  
Pop: C  
Peek: B  
Pop: B  
Vacia? false  
Pop: A  
Vacia? true  
Pop: 0  
  
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>
```

### Antes de modificar el main

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



ctos eclipse - C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\src\main\java\stackHandler...

File Source Refactor Navigate Search Project Run Window Help

Main.java

```
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 expresión 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 + ^ - □ ×

.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: 2.638 s
[INFO] Finished at: 2026-02-20T01:18:35-06:00
[INFO] -----
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>java -jar stackHandler-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 -jar stackHandler-0.0.1-SNAPSHOT.jar "(a+b)"
True

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

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

Edición de la pila stack para que funcione correctamente

Se implementó 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.

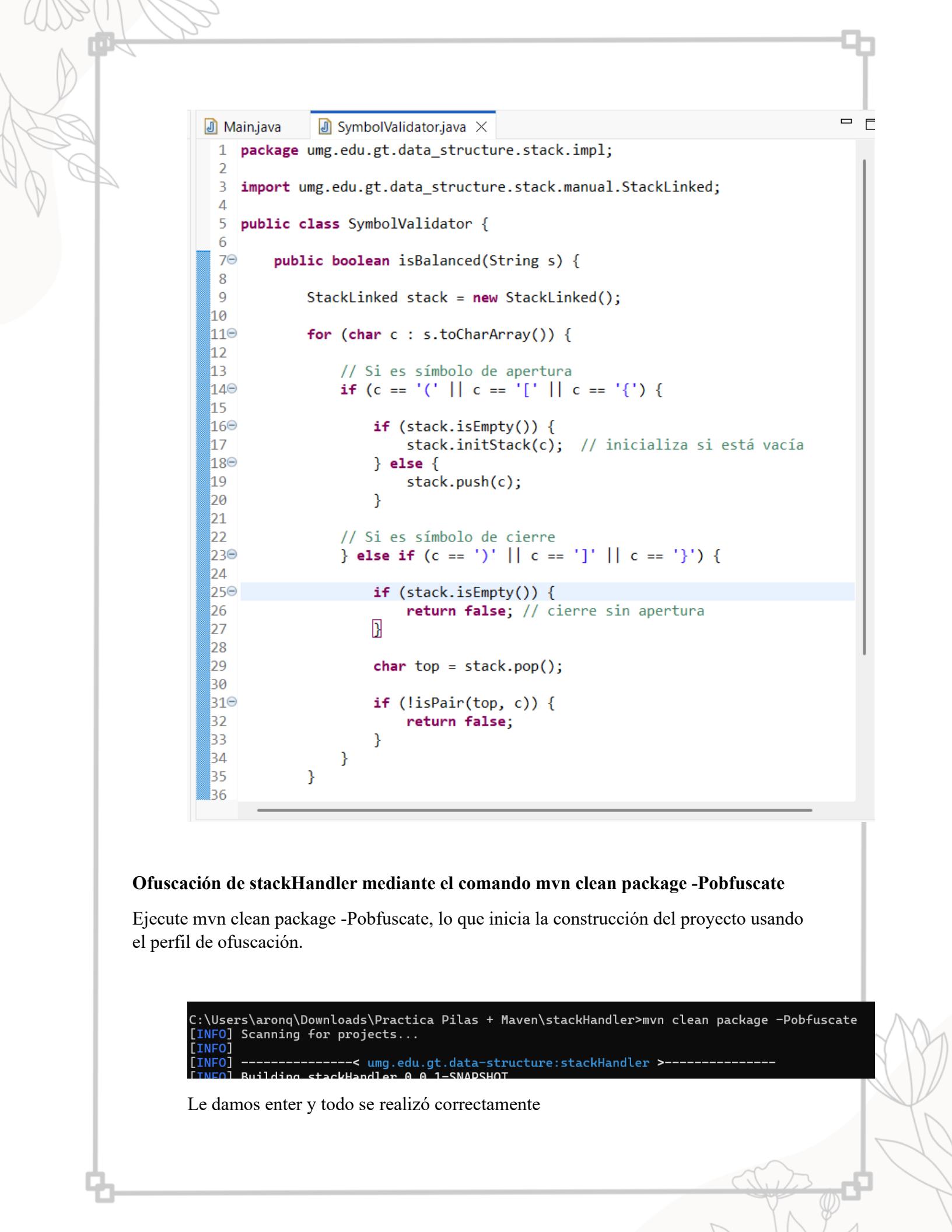
```
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>cd target
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.1-SNAPSHOT.jar "(a+b)*[c-d]"
True

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.1-SNAPSHOT.jar "([)]"
False

C:\Users\aronq\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

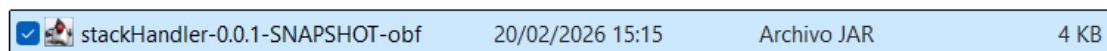
Ejecute mvn clean package -Pobfuscate, lo que inicia la construcción del proyecto usando el perfil de ofuscación.

```
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 realzo y en efecto ya nos aparece la carpeta ofuscada



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]  
[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...  
[INFO]
```

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
[TNEOL] 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
[TNEOL] Scanning for projects...
```

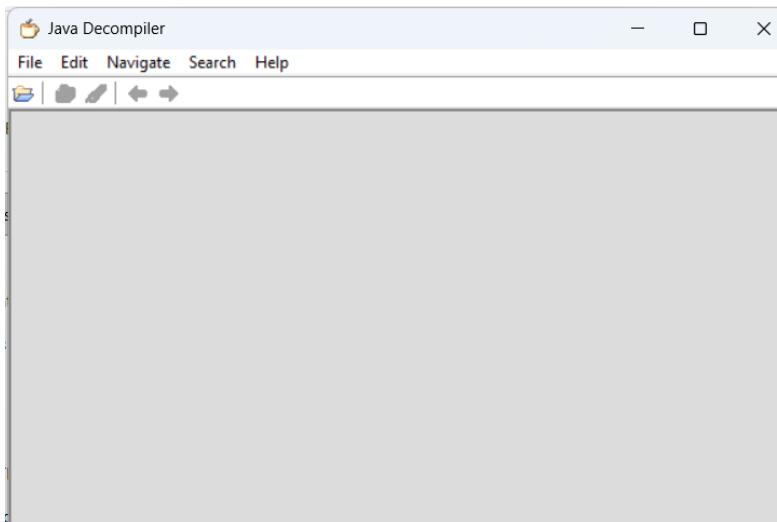
Instale la versión ofuscada en .m2

```
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

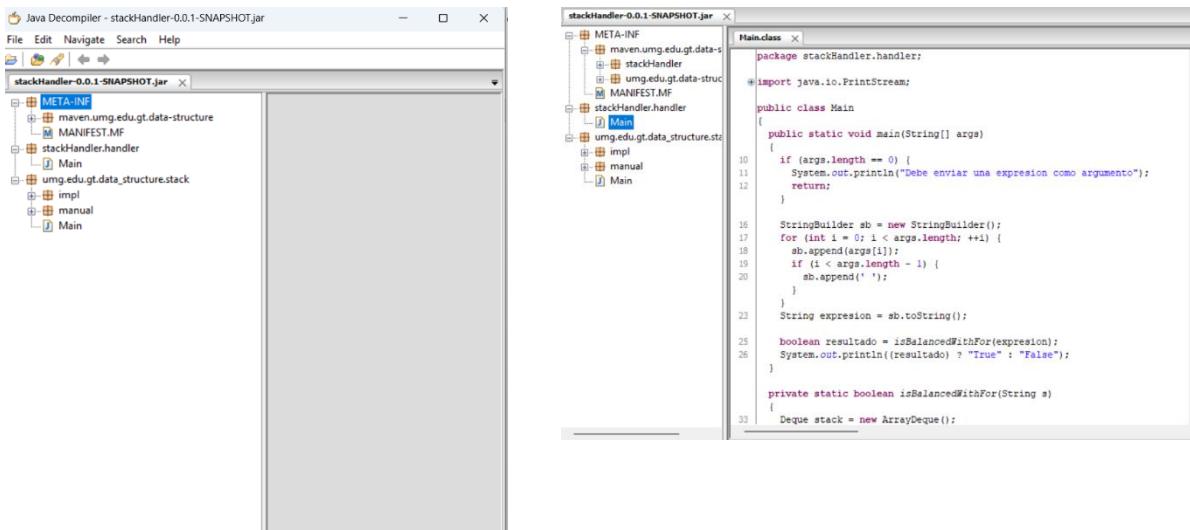
En el módulo umg.edu.gt.data-structure.stack se generó sin inconvenientes el JAR ofuscado usando el perfil configurado en Maven. Después, el proyecto stackHandler se recompiló utilizando esta versión ofuscada como dependencia. La compilación finalizó correctamente y el programa mantuvo el mismo funcionamiento 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)
    {
        Deque stack = new ArrayDeque();
        for (char c : s.toCharArray())
        {
            if ((c == '(') || (c == '[') || (c == '{'))
                stack.push(Character.valueOf(c));
            else if ((c == ')') || (c == ']') || (c == '}'))
                if (stack.isEmpty()) return false;
                char top = ((Character)stack.pop()).charValue();
                if (!isPair(top, c)) return false;
        }
        return stack.isEmpty();
    }

    private boolean isPair(char open, char close)
    {
        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)
    {
        this.value = value;
        this.next = next;
        this.count = (count + 1);
    }
}

```

Java Decomplier - StackLinked.class

File Edit Navigate Search Help

stackHandler-0.0.1-SNAPSHOT.jar

```

Main-class SymbolValidator.class Node.class StackLinked.class

```

META-INF

- maven.umg.edu.gt.data-structure.stack.handler
- stackHandler
- MANIFEST.MF

stackHandler.handler

- Main

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, this.top, 0);
    }

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

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

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

```

Java Decomplier - Main.class

File Edit Navigate Search Help

stackHandler-0.0.1-SNAPSHOT.jar

```

Main-class SymbolValidator.class Node.class StackLinked.class Main.class

```

META-INF

- maven.umg.edu.gt.data-structure.stack.handler
- stackHandler
- MANIFEST.MF

stackHandler.handler

- Main

umg.edu.gt.data\_structure.stack

- impl
- SymbolValidator
- manual
- Node
- StackLinked
- Main

```

package umg.edu.gt.data_structure.stack;

import java.io.PrintStream;

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

        stack.initStack('A');
        stack.push('B');
        stack.push('C');

        System.out.println("Tamaño? " + stack.size());
        System.out.println("Peek: " + stack.peek());
        System.out.println("Pop: " + stack.pop());
        System.out.println("Peek: " + stack.peek());
        System.out.println("Pop: " + stack.pop());
        System.out.println("Vacia? " + stack.isEmpty());
        System.out.println("Pop: " + stack.pop());
        System.out.println("Vacia? " + stack.isEmpty());

        SymbolValidator symbolValidator = new SymbolValidator();
        System.out.println(symbolValidator.isBalanced("(a+b)*(c-d)"));
        System.out.println(symbolValidator.isBalanced("{()}"));
    }
}

```

# ING. INVERSA DEL ARCHIVO JAR OFUSCADO DEL STACKHANDLER

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

The image consists of three vertically stacked screenshots of the Java Decompiler tool JD-GUI, showing the decompiled code for two classes: `a.class` and `b.class`.

**Screenshot 1: Java Decomplier - a.class**

This screenshot shows the decompiled code for class `a`. The code is relatively simple:

```
package a.a.a.a.a.b;
public class a
{
    char a;
    a b;
    int c;

    a(char paramChar, a parama, int paramInt)
    {
        this.a = paramChar;
        this.b = parama;
        this.c = (paramInt + 1);
    }
}
```

**Screenshot 2: Java Decomplier - b.class**

This screenshot shows the decompiled code for class `b`. The code is more complex and contains several imports and local variable declarations:

```
package a.a.a.a.a.b;
import a.a.a.a.b.b;
public class b
{
    public static void a(String[] paramArrayOfString)
    {
        b localb = new b();
        localb.a('A');
        localb.b('B');
        localb.b('C');
        System.out.println("Tamaño? " + localb.b());
        System.out.println("Peek: " + localb.d());
        System.out.println("Pop: " + localb.c());
        System.out.println("Push: " + localb.a());
        System.out.println("Seek: " + localb.e());
        System.out.println("Push: " + localb.c());
        System.out.println("Pop: " + localb.c());
        System.out.println("Vacia? " + localb.a());
        System.out.println("Vacia? " + localb.e());
        a.a.a.a.a.locals = new a.a.a.a.a.a();
        System.out.println(locals.a("a+b) " [c-d]));
        System.out.println(locals.a("{{}}"));
    }
}
```

**Screenshot 3: Java Decomplier - b.class**

This screenshot shows the decompiled code for class `b` again, but with some parts of the code redacted or obscured.

Java Decomplier - Main.class

File Edit Navigate Search Help

stackHandler-0.0.1-SNAPSHOT-obf.jar

META-INF  
  MANIFEST.MF

a.a.a.a  
  a  
  b  
    a  
    b  
  a

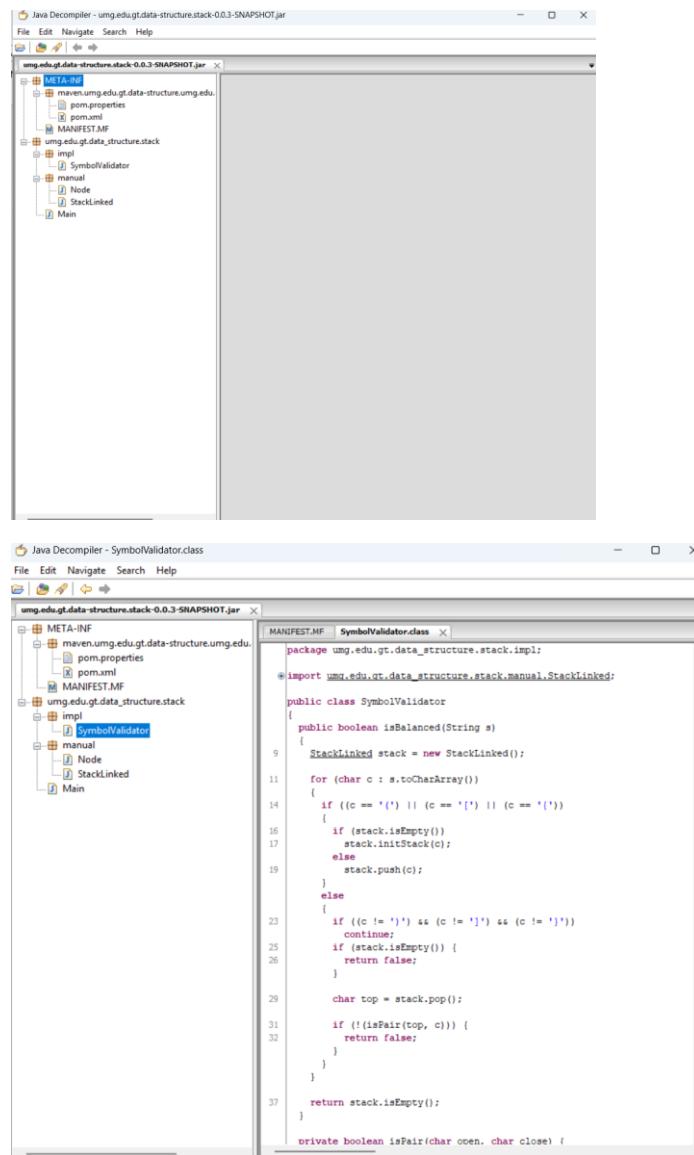
stackHandler.handler  
  Main

MANIFEST.MF a.class b.class a.class Main.class

```
package stackHandler.handler;
import java.io.PrintStream;
public class Main
{
    public static void main(String[] paramArrayOfString)
    {
        if (paramArrayOfString.length == 0)
        {
            System.out.println("Debe enviar una expresion como argumento");
            return;
        }
        StringBuilder localStringBuilder = new StringBuilder();
        for (int i = 0; i < paramArrayOfString.length; ++i)
        {
            localStringBuilder.append(paramArrayOfString[i]);
            if (i >= paramArrayOfString.length - 1)
                continue;
            localStringBuilder.append(' ');
        }
        String str = localStringBuilder.toString();
        boolean bool = a(str);
        System.out.println((bool) ? "True" : "False");
    }

    private static boolean a(String paramString)
    {
        ArrayDeque localArrayDeque = new ArrayDeque();
        for (int i = 0; i < paramString.length(); ++i)
        {
            char c1 = paramString.charAt(i);
            if ((c1 == '!') || (c1 == '&') || (c1 == '#'))
            {
                localArrayDeque.push(Character.valueOf(c1));
            }
            else
            {
                if ((c1 != '!') && (c1 != '&') && (c1 != '#'))
                    if ((c1 != '!') && (c1 != '&') && (c1 != '#'))
```

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



The image shows two screenshots of a Java Decomplier interface. The top screenshot displays the file tree of the JAR file 'umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar'. The bottom screenshot shows the decompiled Java code for the 'SymbolValidator' class.

**File Tree (Top Screenshot):**

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

**Decompiled Code (Bottom Screenshot):**

```
MANIFEST.MF 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 s) {
        StackLinked stack = new StackLinked();
        for (char c : s.toCharArray()) {
            if ((c == '(') || (c == '[') || (c == '{')) {
                if (stack.isEmpty())
                    stack.initStack(c);
                else
                    stack.push(c);
            } else {
                if ((c != ')') && (c != ']') && (c != '}')) {
                    if (stack.isEmpty())
                        return false;
                }
                char top = stack.pop();
                if (!isPair(top, c)) {
                    return false;
                }
            }
        }
        return stack.isEmpty();
    }
    private boolean isPair(char open, char close) {
```

Java Decomplier - 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  
  manual  
    Node  
    StackLinked  
    Main

MANIFEST.MF SymbolValidator.class Node.class X

```
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 Decomplier - 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  
  manual  
    Node  
    StackLinked  
    Main

MANIFEST.MF SymbolValidator.class Node.class StackLinked.class X

```
package umg.edu.gt.data_structure.stack.manual;

public class StackLinked
{
    private Node top;

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

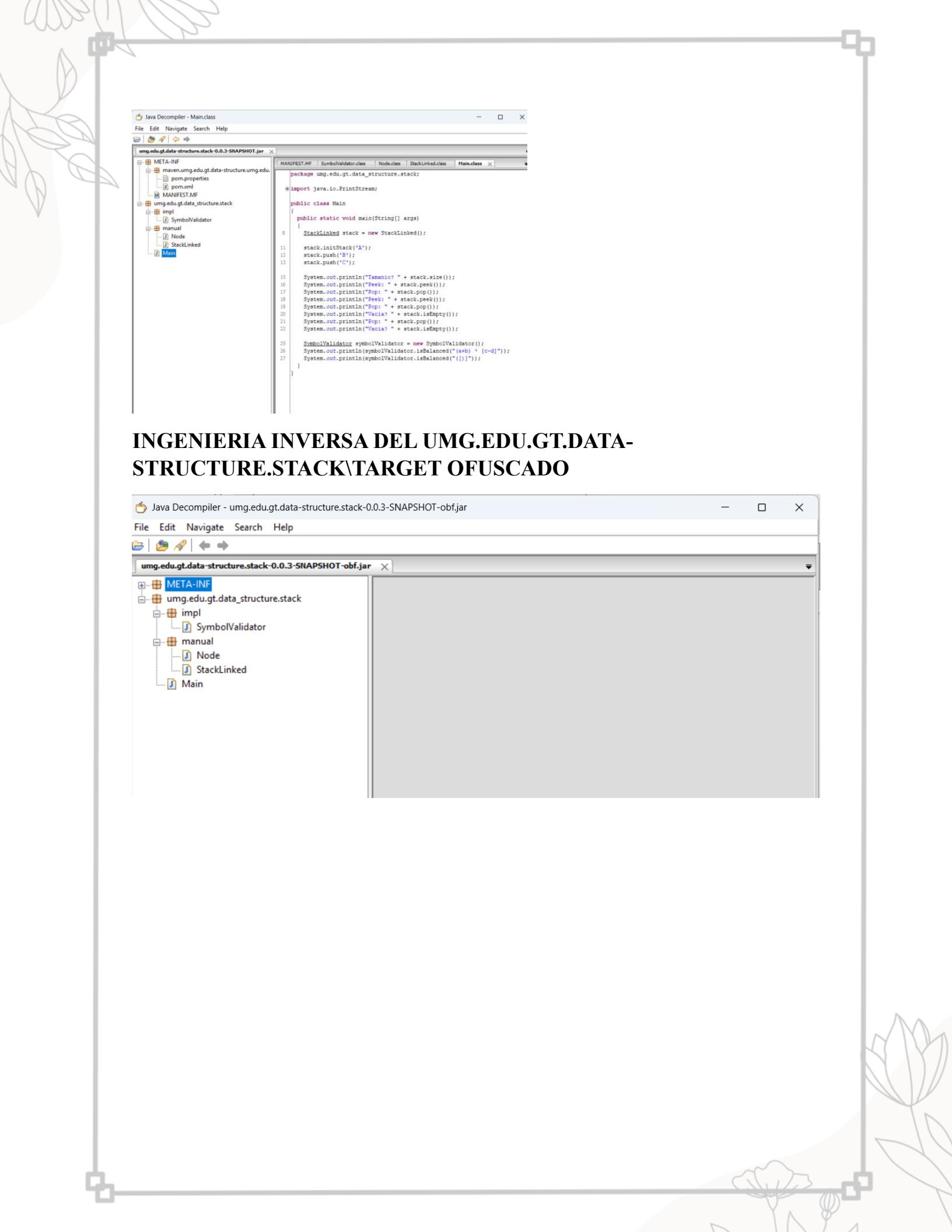
    public void initStack(char value)
    {
        this.top = new Node(value, null, 0);
    }

    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()
    {
    }
}
```



A screenshot of a Java decompiler interface showing the source code of a Java application named "umg.edu.gt.data-structure.stack". The code implements a stack data structure and includes a main method for testing. The interface also displays the project's manifest file and pom.xml configuration.

```
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

MANIFEST.MF  SymbolValidator.class  Node.class  StackLinked.class  Main.class

package umg.edu.gt.data_structure.stack;
import java.io.PrintStream;

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

        stack.initStack('A');
        stack.push('B');
        stack.push('C');

        System.out.println("Tamaño: " + stack.size());
        System.out.println("Peek: " + stack.peek());
        System.out.println("Pop: " + stack.pop());
        System.out.println("Peek: " + stack.peek());
        System.out.println("Pop: " + stack.pop());
        System.out.println("Vacia: " + stack.isEmpty());
        System.out.println("Pop: " + stack.pop());
        System.out.println("Vacia: " + stack.isEmpty());

        SymbolValidator symbolValidator = new SymbolValidator();
        System.out.println(symbolValidator.isBalanced("(ab) * [c-d]"));
        System.out.println(symbolValidator.isBalanced("{()}"));
    }
}
```

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

A screenshot of a Java decompiler interface showing the obfuscated version of the same Java application. The code is highly compressed and lacks readable variable names and comments, demonstrating the result of obfuscation.

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

File Edit Navigate Search Help
META-INF
  umg.edu.gt.data_structure.stack
    impl
      SymbolValidator
    manual
      Node
      StackLinked
    Main
```

Java Decomplier - 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 cl : paramString.toCharArray())
            if ((cl == '(') || (cl == '[') || (cl == '{'))
            {
                if (localStackLinked.isEmpty())
                    localStackLinked.initStack(cl);
                else
                    localStackLinked.push(cl);
            }
            else
            {
                if ((cl != ')') && (cl != ']') && (cl != '}'))
                    continue;
                if (localStackLinked.isEmpty())
                    return false;
                char c2 = localStackLinked.pop();
                if (!isPair(c2, cl))
                    return false;
            }
        return localStackLinked.isEmpty();
    }

    private boolean isPair(char paramChar1, char paramChar2)
    {
        return ((paramChar1 == '(') && (paramChar2 == ')')) || ((paramChar1 == '[') && (paramChar2 == ']')) || ((paramChar1 == '{") && (paramChar2 == '}'));
    }
}
```

Java Decomplier - 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);
    }
}
```

Java Decomplier - StackLinked.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 StackLinked.class

```
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 paramChar)
    {
        this.top = new Node(paramChar, null, 0);
    }

    public void push(char paramChar)
    {
        if (isEmpty())
            initStack(paramChar);
        else
            this.top = new Node(paramChar, 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()
    {
        if (isEmotv())
        {
            return this.top.data;
        }
        else
            this.top = this.top.next;
        return this.top.data;
    }
}
```

Java Decomplier - Main.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

Main.class

```
package umg.edu.gt.data_structure.stack;

import java.io.PrintStream;

public class Main
{
    public static void main(String[] paramArrayOfString)
    {
        StackLinked localStackLinked = new StackLinked();
        localStackLinked.initStack('A');
        localStackLinked.push('B');
        localStackLinked.push('C');
        System.out.println("Tamaño? " + localStackLinked.size());
        System.out.println("Peek: " + localStackLinked.peek());
        System.out.println("Pop: " + localStackLinked.pop());
        System.out.println("Peek: " + localStackLinked.peek());
        System.out.println("Pop: " + localStackLinked.pop());
        System.out.println("Vacia? " + localStackLinked.isEmpty());
        System.out.println("Pop: " + localStackLinked.pop());
        System.out.println("Vacia? " + localStackLinked.isEmpty());
        SymbolValidator localSymbolValidator = new SymbolValidator();
        System.out.println(localSymbolValidator.isBalanced("(a+b) * [c-d]"));
        System.out.println(localSymbolValidator.isBalanced("{[}]"));
    }
}
```