

Software Engineering 2 Glassfish

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# Assigned class

Our team has been assigned to do the code inspection on class WebappClassLoader. It belongs to the package org.glassfish.web.loader

Functions to be covered are:

* findClassInternal(String name)
* findResourceInternal(String name, String path)
* findResourceInternalFromRepositories(String name, String path)

# Functional role of assigned class

WebappClassLoader

***findClassInternal(String name) –*** find specified class in local repositories. The function requires a class path as a parameter.

First we check if the class path is invalid (if the path is null or starts with “java.”), if so the appropriate exception is thrown. If the path is valid we build absolute path to the compiled version of the java class. Next, we call findResourceInternal(String,String) to find specified ResourceEntry object. If the entry is not found the ClassNotFound exception is thrown, else search for loadedClass concurrently from the entry. If the extracted class is not null we return it as result of function execution, on contrary we check if binary content is not null, we go up to package where class is defined. First we extract package name, then if package is not defined we create it with given package name if manifest of entry is empty, otherwise we create it with additional attributes.

After that provide seal check which means that if securityManger is used then all packages must be sealed. If that is not a case we just return found entry.

***findResourceInternal(String name, String path) –*** find specified resource in local repository. Function requires resource name and resource path as a parameter.

First we check if particular component is starter (if the “.class” file exists), appropriate exception is thrown. After that we check if the function parameters are valid. Next, we check if the resource entry exists in the concurrent hash map, if yes we return it as a result of the function, if not we check if the resource was searched before by checking notFoundResources hash map by his key value (resource name). If neither assumption is true we start searching for the resource in other repositories (findResourceInternalFromRepositories), if resource is not found in repositories, we search it in jar files concurrently (findResourceInternalFromJars). If resource is still not found we put it in notFoundResources hash map and return null as result. Otherwise if the resource was found in repo or jar we first update resourceEntries hash map and then return resource as a hash map.

***findResourceInternalFromRepositories(String name, String path) –*** tries to find and load specified resource from internal repositories of the class. Function requires resource name and resource path as a parameter.

First a check is done if repositories array exists (not null), then we go through repositories array to find the specified resource.

In each iteration we build full path to the file by concatenating the repository path to the relative path of the searched resource, then we check if the resource exists in the DirContext table using the previously created full path. After that we build the resource entry in a privileged way (AccessController.doPriviledged) or using findResourceInternal(File file,String path) function which builds the ResourceEntry object by setting its source and codeBase attributes. After setting attributes of ResourceEntry object we extract contentLength and lastModified from the resource found in DirContext. lastModified attribute of ResourceEntry is set and we extract binary stream from the found Resource object. In a concurrent way with all permissions we modify two arrays (lastModifiedDates and paths) by adding the entry’s lastModified attribute and the fullPath to the particular resource to the arrays, respectively.

After the for loop finishes, we check the reason for its breaking i.e if the resource entry was found or we have search in all repositories and have not found the specified resource (entry!=null). If the entry was found we read the binaryContent from the InputStream parameter of readEntryData function and set the binaryContent attribute of the ResourceEntry.

In the end of the function the build ResourceEntry object is returned.

# List of issues found

## Method 1 – findClassInternal(String name)

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| --- | --- | --- | --- |
| Naming conventions | | | |
| Checklist point | Issue | Line | Details |
| 1 | Parameter: name | 2727 | parameter *name* does not give enough information about what it represents. (name -> className) |
| 1 | Variable: entry | 2736 | Does not give enough information  (entry -> resourceEntry) |
| 1 | Variable: clazz | 2742 | Inappropriate name  (clazz -> classEntry) |
| 1 | Variable: pkg | 2756 | Does not give enough information  (pkg -> packageObject) |
| 1 | Function: validate | 3279 | Function is not specific enough |
| 3 | Class name: WebappClassLoader | 149 | First letter of each word sould be capitalized  (class WebappClassLoader -> class Web**A**ppClassLoader) |
| 5 | Method name: modified() | 1036 | Method names should be verbs, and modified is not a verb. |
| 5 | Method name: *nullInstance* | 2237 | Method names should be verbs, or should start with a verb. |
| 5 | Method name: *loadedByThisOrChild* | 2457 | Method names should be verbs, or should start with a verb. |

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| --- | --- | --- | --- |
| Indention | | | |
| Checklist point | Issue | Line | Details |
| 8 | More spaces used for indention | 2739 | There are more than 7 spaces for indention. It should be reduced to 4. |
| 8 | Less spaces used for indention | 2761 and 2775 | There are just 2 spaces used for indention. It should be 3 or 4. |
| 8 | Block in code is not indent | 2762-2774 | This code should be indented by 3 or 4 spaces. |

|  |  |  |  |
| --- | --- | --- | --- |
| Braces | | | |
| Checklist point | Issue | Line | Details |
| 10 | Kernighan and Ritchie style is used | In whole class | First brace is on the same line of the instruction that opens the new block |
| 11 | If-statement has one statement | 2730 | Correct way is that the statement is surrounded by curly brackets |
| 11 | If-statement has one statement | 2738 | Correct way is that the statement is surrounded by curly brackets |
| 11 | If-statement has one statement | 2743 | Correct way is that the statement is surrounded by curly brackets |
| 11 | If-statement has one statement | 2754 | Correct way is that the statement is surrounded by curly brackets |
| 11 | If-statement has one statement | 2791 | Correct way is that the statement is surrounded by curly brackets |

|  |  |  |  |
| --- | --- | --- | --- |
| File organization | | | |
| Checklist point | Issue | Line | Details |
| 12 | Blank lines that don’t separate sections |  | There are blank lines that don’t separate sections, those are probably present to separate things conceptually different. However this requirement is respected which means that sections are correctly separated by blank lines in the entire class. |

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| --- | --- | --- | --- |
| Wrapping lines | | | |
| Checklist point | Issue | Line | Details |
| 15 | Line break is not correct | 2788 | Line is separated before an operator “II” |
| 15 | Line break is not correct | 2793 | Line is separated before an operator “+” |
| 16 | High level break is present in this function | 2792-2794 | Break doesn’t occur after coma or an operator. |

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| --- | --- | --- | --- |
| Class and interface declaration | | | |
| Checklist point | Issue | Line | Details |
| 25 | Class implementation comment | 112-148 | Class implementation comment is in wrong position, it should be after class statement. |
| 25 | Wrong order of class static variables | 157, 160, 167 | In class WebAppClassLoader there are first declared private static variables instead of public ones. |
| 25 | Wrong order of instance variables | 352-541 | Instance variables are declared in wrong order. Order should be: public, protected, package level and private as last. This is not the case in this class. |

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| --- | --- | --- | --- |
| Initialization and Declarations | | | |
| Checklist point | Issue | Line | Details |
| 33 | Declarations at the beginning of block | 2733, 2734, 2736, 2752, 2753 and 2757 | Declarations at those lines are not on the beginning of the block. |

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| --- | --- | --- | --- |
| Method Calls | | | |
| Checklist point | Issue | Line | Details |
| 36 | Method returned values are not used properly | 2768 and 2771 | Should be  pkg = definePackage(packageName, null, null, null, null, null, null, null); |

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| --- | --- | --- | --- |
| Computation, Comparisons and Assignments | | | |
| Checklist point | Issue | Line | Details |
| 44 | Brutish programming present | 2779-2796 | Brutish programing is presented in a way that there are too many if checks. |
| 45 | Operator precedence problems | 2788-2789 | Parenthesis are used to avoid operator precedence problems. |

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| Exceptions | | | |
| Checklist point | Issue | Line | Details |
| 53 | Exception is not caught | 2792 | SecurityException is thrown and is not properly handled in the function, and it is neither stated in the function declaration. |

## Method 2 - findResourceInternal(String name, String path)

|  |  |  |  |
| --- | --- | --- | --- |
| Naming conventions | | | |
| Checklist point | Issue | Line | Details |
| 1 | Parameter: name | 2825 | parameter *name* does not give enough information about what it represents. (parameter name -> resourceName) |
| 1 | Variable: started | 2826 | Does not give enough information  (started -> resourceStarted) |
| 1 | Variable: entry | 2835 | Inappropriate name  (entry -> resourceEntry) |

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| --- | --- | --- | --- |
| Indention | | | |
| Checklist point | Issue | Line | Details |
| 8 | More spaces used for indention | 2827 | Line has 4 spaces more that it should have |

|  |  |  |  |
| --- | --- | --- | --- |
| Braces | | | |
| Checklist point | Issue | Line | Details |
| 10 | Kernighan and Ritchie style is used | In whole class | First brace is on the same line of the instruction that opens the new block |

|  |  |  |  |
| --- | --- | --- | --- |
| File organization | | | |
| Checklist point | Issue | Line | Details |
| 12 | Blank lines that don’t separate sections |  | There are blank lines that don’t separate sections, those are probably present to separate things conceptually different. However this requirement is respected which means that sections are correctly separated by blank lines in the entire class. |

|  |  |  |  |
| --- | --- | --- | --- |
| Wrapping lines | | | |
| Checklist point | Issue | Line | Details |
| 15 | Line break is not correct | 2827 | Line wrap is in front of open bracket which is not by the proposed rules, also the length of the line is not greater than 80 characters |

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| --- | --- | --- | --- |
| Comments | | | |
| Checklist point | Issue | Line | Details |
| 19 | Comments do not contain dates | 2855-2858 | Comment from line 2855-2858 do not contain date when it should be removed. |

|  |  |  |  |
| --- | --- | --- | --- |
| Class and interface declaration | | | |
| Checklist point | Issue | Line | Details |
| 25 | Class implementation comment | 112-148 | Class implementation comment is in wrong position, it should be after class statement. |
| 25 | Wrong order of class static variables | 157, 160, 167 | In class WebAppClassLoader there are first declared private static variables instead of public ones. |
| 25 | Wrong order of instance variables | 352-541 | Instance variables are declared in wrong order. Order should be: public, protected, package level and private as last. This is not the case in this class. |

|  |  |  |  |
| --- | --- | --- | --- |
| Initialization and Declarations | | | |
| Checklist point | Issue | Line | Details |
| 33 | Declarations at the beginning of block | 2835 and 2859 | Line 2835 – *entry* variable is not declared in the beginning of block of code  Line 2859 – *entry2* variable is not declared in the beginning of block of code |

|  |  |  |  |
| --- | --- | --- | --- |
| Methods Calls | | | |
| Checklist point | Issue | Line | Details |
| 35 | Wrong function call | 2851 | function putIfAbsent(name,name) should be used instead of put(name,name) because previously we checked that this key does not exist in the hash map |

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| --- | --- | --- | --- |
| Output Format | | | |
| Checklist point | Issue | Line | Details |
| 42 | Error message not descriptive enough | 2827 | throws exception that the web container has not yet been started but the message displayed will be “AS-WEB-UTIL-00010” which does not give information how to solve the issue |

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| --- | --- | --- | --- |
| Computation, Comparisons and Assignments | | | |
| Checklist point | Issue | Line | Details |
| 44 | Brutish programming present | 2836-2862 | Brutish programing is presented in a way that there are too many if checks. |
| 45 | Operator precedence problems | 2831 | Parenthesis are used to avoid operator precedence problems. |

## Method 3 - findResourceInternalFromRepositories(String name, String path)

|  |  |  |  |
| --- | --- | --- | --- |
| Naming conventions | | | |
| Checklist point | Issue | Line | Details |
| 1 | Parameter: name | 2874 | parameter *name* does not give enough information about what it represents. (name -> resourceName) |
| 1 | Parameter: path | 2875 | Does not give enough information  (path -> resourcePath) |
| 1 | Variable: repositories | 399 | Inappropriate name  (repositories-> repositoriesPath) |
| 1 | Variable: dp | 2900 | Does not give enough information  (dp -> priviledgedAction) |
| 1 | Variable: result2 | 2926 | Does not give enough information  (result2 -> lastModifiedDatesExtended) |
| 1 | Variable: result | 2934 | Does not give enough information  (result -> pathsExtended) |

|  |  |  |  |
| --- | --- | --- | --- |
| Braces | | | |
| Checklist point | Issue | Line | Details |
| 10 | Kernighan and Ritchie style is used | In whole class | First brace is on the same line of the instruction that opens the new block |

|  |  |  |  |
| --- | --- | --- | --- |
| File organization | | | |
| Checklist point | Issue | Line | Details |
| 12 | Blank lines that don’t separate sections |  | There are blank lines that don’t separate sections, those are probably present to separate things conceptually different. However this requirement is respected which means that sections are correctly separated by blank lines in the entire class. |

|  |  |  |  |
| --- | --- | --- | --- |
| Comments | | | |
| Checklist point | Issue | Line | Details |
| 18 | Comment not descriptive enough | 2897 | Comment of the fn is well written, but comment on line 2897 is and explained because it doesn’t tell what the code does instead it just inform us that if exception is thrown the resource was found |
| 19 | Comments do not contain dates |  | Comments are not written in the proposed way |

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| --- | --- | --- | --- |
| Class and interface declaration | | | |
| Checklist point | Issue | Line | Details |
| 25 | Class implementation comment | 112-148 | Class implementation comment is in wrong position, it should be after class statement. |
| 25 | Wrong order of class static variables | 157, 160, 167 | In class WebAppClassLoader there are first declared private static variables instead of public ones. |
| 25 | Wrong order of instance variables | 352-541 | Order should be: public, protected, package level and private as last. This is not the case in this class. |

|  |  |  |  |
| --- | --- | --- | --- |
| Initialization and Declarations | | | |
| Checklist point | Issue | Line | Details |
| 32 | Variable not initialized | 2924 | Variable j is declared as int but not initialized on the spot |
| 33 | Declarations at the beginning of block | 2881 to 2885, 2907 and 2934 | Declarations at those lines are not on the beginning of the block. |

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| Arrays | | | |
| Checklist point | Issue | Line | Details |
| 38 | Array variable might go out of bound | 2901 | For loop depends on the length of repositories, and in the for block array variable files is accessed through counter i. Variable files[i], counter i is connected to variable repositories[i], if the length of files is less than length of repositories files will go out of bound |

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| Exceptions | | | |
| Checklist point | Issue | Line | Details |
| 53 | Exception is not properly handled | 2943 | Catch block is empty, exception is not handled |

# Other problems

There is an error in the line 2912 of the third function findResourceInternalFromRepositories. Issue is related to the position of ***if*** statement:

ResourceAttributes attributes =

(ResourceAttributes) resources.getAttributes(fullPath);

contentLength = (int) attributes.getContentLength();

entry.lastModified = attributes.getLastModified();

***if (resource != null) {***

try {

binaryStream = resource.streamContent();

} catch (IOException e) {

return null;

}

...

…

Code written this way could give NullException because we use the resource instance before checking if the instance is set (resource!=null). It should be written in following way:

***if (resource != null) {***

ResourceAttributes attributes =

(ResourceAttributes) resources.getAttributes(fullPath);

contentLength = (int) attributes.getContentLength();

entry.lastModified = attributes.getLastModified();

try {

binaryStream = resource.streamContent();

} catch (IOException e) {

return null;

}

...

…