

Julien: Can you optimize the following Java code ?

```
import io.cucumber.core.logging.Logger;
import io.cucumber.core.logging.LoggerFactory;
import io.cucumber.core.resource.ClassLoaders;

import java.util.Arrays;
import java.util.function.Predicate;
import java.util.stream.Stream;

import static io.cucumber.core.exception.UnrecoverableExceptions.rethrowIfUnrecoverable;

/**
 * Identifies which exceptions signal that a test has been aborted.
 */
final class TestAbortedExceptions {

    private static final Logger log = LoggerFactory.getLogger(TestAbortedExceptions.class);

    private static final String[] TEST_ABORTED_EXCEPTIONS = {
        "org.junit.AssumptionViolatedException",
        "org.junit.internal.AssumptionViolatedException",
        "org.opentest4j.TestAbortedException",
        "org.testng.SkipException",
    };

    static Predicate<Throwable> createIsTestAbortedExceptionPredicate() {
        ClassLoader defaultClassLoader = ClassLoaders.getDefaultClassLoader();
        return Arrays.stream(TEST_ABORTED_EXCEPTIONS)
            .flatMap(s -> {
                try {
                    Class<?> aClass = defaultClassLoader.loadClass(s);
                    return Stream.of(aClass);
                }
            })
    }
}
```

```

    } catch (Throwable t) {
        rethrowIfUnrecoverable(t);
        log.debug(t,
            () -> "Failed to load class" + s + ": will not be supported for aborted executions.");
    }
    return Stream.empty();
})
.map(throwable -> (Predicate<Throwable>) throwable::isInstance)
.reduce(__ -> false, Predicate::or);
}

private TestAbortedExceptions() {

}

}

```

ChatGPT : Here are a few suggestions for optimizing the Java code:

You can use a static block to initialize the TEST_ABORTED_EXCEPTIONS array, instead of initializing it every time the createIsTestAbortedExceptionPredicate method is called.

Instead of using the flatMap method to map the TEST_ABORTED_EXCEPTIONS array to a stream of classes, you can use the map method to map the array to a stream of Predicate objects. This will avoid the need to catch and handle exceptions when trying to load the classes.

You can use the log.isDebugEnabled method to check if debugging is enabled before logging a message, which can avoid the overhead of constructing the log message if debugging is not enabled.

Here's the modified code with these changes applied:

Copy code

```

import io.cucumber.core.logging.Logger;
import io.cucumber.core.logging.LoggerFactory;

```

```

import io.cucumber.core.resource.ClassLoaders;

import java.util.Arrays;
import java.util.function.Predicate;
import java.util.stream.Stream;

import static io.cucumber.core.exception.UnrecoverableExceptions.rethrowIfUnrecoverable;

/**
 * Identifies which exceptions signal that a test has been aborted.
 */
final class TestAbortedExceptions {

    private static final Logger log = LoggerFactory.getLogger(TestAbortedExceptions.class);

    private static final String[] TEST_ABORTED_EXCEPTIONS;
    private static final ClassLoader DEFAULT_CLASS_LOADER = ClassLoaders.getDefaultClassLoader();

    static {
        TEST_ABORTED_EXCEPTIONS = new String[] {
            "org.junit.AssumptionViolatedException",
            "org.junit.internal.AssumptionViolatedException",
            "org.opentest4j.TestAbortedException",
            "org.testng.SkipException",
        };
    }

    static Predicate<Throwable> createIsTestAbortedExceptionPredicate() {
        return Arrays.stream(TEST_ABORTED_EXCEPTIONS)
            .map(s -> {
                try {
                    Class<?> aClass = DEFAULT_CLASS_LOADER.loadClass(s);

```

```

        return throwable -> aClass.isInstance(throwable);
    } catch (Throwable t) {
        rethrowIfUnrecoverable(t);
        if (log.isDebugEnabled()) {
            log.debug(t,
                () -> "Failed to load class" + s + ": will not be supported for aborted executions.");
        }
    }
    return __ -> false;
})
.reduce(__ -> false, Predicate::or);
}

private TestAbortedExceptions() {

}

}

```

Julien : Can you replace the reduce operation by something more readable ?

ChatGPT: Certainly! Instead of using the reduce method to combine the Predicate objects, you could use the or method of the Predicates class to combine the Predicate objects.

Here's the modified code:

Copy code

```

import io.cucumber.core.logging.Logger;
import io.cucumber.core.logging.LoggerFactory;
import io.cucumber.core.resource.ClassLoaders;
import io.cucumber.core.util.Predicates;

```

```

import java.util.Arrays;
import java.util.function.Predicate;
import java.util.stream.Stream;

import static io.cucumber.core.exception.UnrecoverableExceptions.rethrowIfUnrecoverable;

/**
 * Identifies which exceptions signal that a test has been aborted.
 */
final class TestAbortedExceptions {

    private static final Logger log = LoggerFactory.getLogger(TestAbortedExceptions.class);

    private static final String[] TEST_ABORTED_EXCEPTIONS;
    private static final ClassLoader DEFAULT_CLASS_LOADER = ClassLoaders.getDefaultClassLoader();

    static {
        TEST_ABORTED_EXCEPTIONS = new String[] {
            "org.junit.AssumptionViolatedException",
            "org.junit.internal.AssumptionViolatedException",
            "org.opentest4j.TestAbortedException",
            "org.testng.SkipException",
        };
    }

    static Predicate<Throwable> createIsTestAbortedExceptionPredicate() {
        return Arrays.stream(TEST_ABORTED_EXCEPTIONS)
            .map(s -> {
                try {
                    Class<?> aClass = DEFAULT_CLASS_LOADER.loadClass(s);
                    return throwable -> aClass.isInstance(throwable);
                }
            })
    }
}

```

```

    } catch (Throwable t) {
        rethrowIfUnrecoverable(t);
        if (log.isDebugEnabled()) {
            log.debug(t,
                () -> "Failed to load class" + s + ": will not be supported for aborted executions.");
        }
    }
    return __ -> false;
})
.reduce(Predicates::or)
.orElse(__ -> false);
}

private TestAbortedExceptions() {

}

}

```

The or method of the Predicates class combines two Predicate objects by returning a new Predicate that returns true if either of the input Predicate objects returns true.

The orElse method returns the value of the Optional if it is present, or the specified default value if it is not. In this case, the default value is a Predicate that always returns false.

Julien : I would prefer to replace the reduce operation by something like anyMatch. Can you do this please ?

ChatGPT: Certainly! Instead of using the reduce method, you can use the anyMatch method of the Stream class to check if any of the Predicate objects return true for a given input.

Here's the modified code:

Copy code

```
import io.cucumber.core.logging.Logger;
import io.cucumber.core.logging.LoggerFactory;
import io.cucumber.core.resource.ClassLoaders;

import java.util.Arrays;
import java.util.function.Predicate;
import java.util.stream.Stream;

import static io.cucumber.core.exception.UnrecoverableExceptions.rethrowIfUnrecoverable;

/**
 * Identifies which exceptions signal that a test has been aborted.
 */
final class TestAbortedExceptions {

    private static final Logger log = LoggerFactory.getLogger(TestAbortedExceptions.class);

    private static final String[] TEST_ABORTED_EXCEPTIONS;
    private static final ClassLoader DEFAULT_CLASS_LOADER = ClassLoaders.getDefaultClassLoader();

    static {
        TEST_ABORTED_EXCEPTIONS = new String[] {
            "org.junit.AssumptionViolatedException",
            "org.junit.internal.AssumptionViolatedException",
            "org.opentest4j.TestAbortedException",
            "org.testng.SkipException",
        };
    }

    static Predicate<Throwable> createIsTestAbortedExceptionPredicate() {
```

```

return throwable -> Arrays.stream(TEST_ABORTED_EXCEPTIONS)
    .map(s -> {
        try {
            Class<?> aClass = DEFAULT_CLASS_LOADER.loadClass(s);
            return aClass.isInstance(throwable);
        } catch (Throwable t) {
            rethrowIfUnrecoverable(t);
            if (log.isDebugEnabled()) {
                log.debug(t,
                    () -> "Failed to load class" + s + ": will not be supported for aborted executions.");
            }
        }
        return false;
    })
    .anyMatch(b -> b);
}

private TestAbortedExceptions() {

}

}

```

The `anyMatch` method returns true if any element of the stream matches the given predicate, and false otherwise.

In this case, the stream is created from the `TEST_ABORTED_EXCEPTIONS` array, and the predicate checks if the throwable argument is an instance of the class represented by each element of the array. If any of these checks returns true, the `anyMatch` method will return true.

Julien : Well done that's much more readable. The method `createIsTestAbortedExceptionPredicate` is called very frequently. Can you add some caching ?

ChatGPT: Certainly! You can add caching to the `createIsTestAbortedExceptionPredicate` method by using a `Map` to store the `Predicate` objects that have already been created. This will avoid the overhead of recreating the `Predicate` objects every time the method is called.

Here's the modified code with caching added:

Copy code

```
import io.cucumber.core.logging.Logger;
import io.cucumber.core.logging.LoggerFactory;
import io.cucumber.core.resource.ClassLoaders;

import java.util.Arrays;
import java.util.HashMap;
import java.util.Map;
import java.util.function.Predicate;
import java.util.stream.Stream;

import static io.cucumber.core.exception.UnrecoverableExceptions.rethrowIfUnrecoverable;

/**
 * Identifies which exceptions signal that a test has been aborted.
 */
final class TestAbortedExceptions {

    private static final Logger log = LoggerFactory.getLogger(TestAbortedExceptions.class);

    private static final String[] TEST_ABORTED_EXCEPTIONS;
    private static final ClassLoader DEFAULT_CLASS_LOADER = ClassLoaders.getDefaultClassLoader();
    private static final Map<String, Predicate<Throwable>> PREDICATE_CACHE = new HashMap<>();

    static {
```

```

TEST_ABORTED_EXCEPTIONS = new String[] {
    "org.junit.AssumptionViolatedException",
    "org.junit.internal.AssumptionViolatedException",
    "org.opentest4j.TestAbortedException",
    "org.testng.SkipException",
};
}

static Predicate<Throwable> createIsTestAbortedExceptionPredicate() {
    return throwable -> Arrays.stream(TEST_ABORTED_EXCEPTIONS)
        .map(s -> PREDICATE_CACHE.computeIfAbsent(s, TestAbortedExceptions::createPredicate))
        .anyMatch(predicate -> predicate.test(throwable));
}

private static Predicate<Throwable> createPredicate(String className) {
    try {
        Class<?> aClass = DEFAULT_CLASS_LOADER.loadClass(className);
        return aClass::isInstance;
    } catch (Throwable t) {
        rethrowIfUnrecoverable(t);
        if (log.isDebugEnabled()) {
            log.debug(t,
                () -> "Failed to load class" + className + ": will not be supported for aborted
executions.");
        }
    }
    return __ -> false;
}

private TestAbortedExceptions() {
}

```

```
}
```

The PREDICATE_CACHE map stores the Predicate objects that have already been created, keyed by the class name. The computeIfAbsent method is used to retrieve the Predicate for a given class name from the cache, or create a new one if it doesn't exist in the cache.

The anyMatch method is then used to check if any of the Predicate objects in the stream return true for the given input

Julien : Instead of a cache, I think it would be better to store directly the four Class objects which corresponds to TEST_ABORTED_EXCEPTIONS. Can you do this ?

ChatGPT: Certainly! Instead of using a Map to store the Predicate objects, you can store the Class objects directly in an array. This will avoid the overhead of creating the Predicate objects and looking them up in the Map.

Here's the modified code with the Class objects stored directly in an array:

Copy code

```
import io.cucumber.core.logging.Logger;
import io.cucumber.core.logging.LoggerFactory;
import io.cucumber.core.resource.ClassLoaders;

import java.util.Arrays;
import java.util.function.Predicate;

import static io.cucumber.core.exception.UnrecoverableExceptions.rethrowIfUnrecoverable;

/**
 * Identifies which exceptions signal that a test has been aborted.
 */
```

```

final class TestAbortedExceptions {

    private static final Logger log = LoggerFactory.getLogger(TestAbortedExceptions.class);

    private static final String[] TEST_ABORTED_EXCEPTIONS = {
        "org.junit.AssumptionViolatedException",
        "org.junit.internal.AssumptionViolatedException",
        "org.opentest4j.TestAbortedException",
        "org.testng.SkipException",
    };

    private static final Class<?>[] TEST_ABORTED_CLASSES;

    private static final ClassLoader DEFAULT_CLASS_LOADER = ClassLoaders.getDefaultClassLoader();

    static {
        TEST_ABORTED_CLASSES = new Class<?>[TEST_ABORTED_EXCEPTIONS.length];
        for (int i = 0; i < TEST_ABORTED_EXCEPTIONS.length; i++) {
            try {
                TEST_ABORTED_CLASSES[i] =
                DEFAULT_CLASS_LOADER.loadClass(TEST_ABORTED_EXCEPTIONS[i]);
            } catch (Throwable t) {
                rethrowIfUnrecoverable(t);
                if (log.isDebugEnabled()) {
                    log.debug(t,
                        () -> "Failed to load class" + TEST_ABORTED_EXCEPTIONS[i] + ": will not be supported
for aborted executions.");
                }
            }
        }
    }

    static Predicate<Throwable> createIsTestAbortedExceptionPredicate() {
        return throwable -> Arrays.stream(TEST_ABORTED_CLASSES)

```

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        .anyMatch(aClass -> aClass != null && aClass.isInstance(throwable));  
    }  
  
    private TestAbortedExceptions() {  
  
    }  
  
}
```

The TEST_ABORTED_CLASSES array stores the Class objects for the exceptions that signal that a test has been aborted. The createIsTestAbortedExceptionPredicate method then uses

Julien: Can you replace the for loop with Stream-based operations please ?

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