

Java function callback

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java.lang.Object Callback public class Callback extends java.lang.Object Generic class to facilitate use of callbacks Also provides a static helper function to get an object of Method that can be passed to the constructor of this class Example: To get a Method object for the method public foo(String str) in class Test: String[] paramTypes = {"java.lang.String"}; Method method = Callback.getMethod("foo", this, paramTypes); Callback cb = new Callback(method, this, "fooTest"); The above code snippet assumes that it is written inside class Test, hence the use of this. The method must have public visibility. Constructor Summary Callback(java.lang.reflect.Method method, java.lang.Object obj, java.lang.Object[] params) Initializes member variables. Method static java.lang.reflect.Method getMethod(java.lang.Object obj, java.lang.String[] paramTypes) Helped function to get a Method object which is needed to pass to the constructor of this class void invoke() Invokes the callback void setParams(java.lang.Object[] params) Sets the params to be passed to the method when it is invoked. Methods inherited from class java.lang.Object clone, equals, finalize, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait public Callback(java.lang.reflect.Method method, java.lang.Object obj, java.lang.Object[] params) Initializes member variables Parameters:method - The method to be invokedobj - The object on which the method is to be invokedparams - An array of objects to be passed to the method as parameters when it is invoked Can be null if no parameters are to be passed toParams:public void setParams(java.lang.Object[] params) Sets the params to be passed to the method when it is invoked Parameters:params - The params to be passed to the method when it is invoked void invoke() throws java.lang.IllegalArgumentException - Thrown by invoke method in class Method if the underlying method throws an exception. Method reflect.invoke() throws java.lang.SecurityException Helper function to get a Method object which is needed to pass to the constructor of this class Parameters.methodName - The name of the method that we want a Method object forobj - The object that owns the methodparamTypes - Array of strings of parameter type names. Can be null if there are no parameter types Returns: A Method object which can be passed to the constructor of this class Throws: java.lang.ClassNotFoundException - This exception is thrown by Class.forName if the given class name does not exist java.lang.NoSuchMethodException - Thrown by Class.getMethod if a matching method is not found java.lang.SecurityException - Thrown by Class.getMethod if access to the information is denied It is a bit weird, in the world that everything is asynchronous, I needed to write synchronous code and even throw the exception. But for adding new features to a legacy OOP system that implemented by Java it is normal. Recently I had some tasks on this kind of system that was very robust and adhered to OOP design patterns. One of my tasks was about adding support for a new printer brand to a legacy system and I should implement several classes and interfaces during this task. Failure handled by throwing an exception on the legacy system and several methods signature throws PrintingException. For example, there was a method called printText which returned void, if this method could print successfully nothing happened and returned nothing (void) but if there was a problem in the printing process I should throw a PrintingException (all codes in this post are not real and are just sample code) The new printer provided a Java API for communication, which worked by Listener (the common name for callback in Java world) and in the printText method I should call printer Java API and set a callback for it but I couldn't throw an exception in onFailure or onTimeout callback methods:Callbacks are suitable for the asynchronous world but were not suitable for this kind of synchronous system. Because the parent method that called printText , wrapped it into a try-catch and handle failure by checking the type of PrintingException . I know that this design was not good but I could not change it. For making this asynchronous callback to synchronous method call with the ability to throwing an exception, I needed to synchronize it. One option was using synchronized block and using wait() and notify() mechanism in Java. For achieving this goal, I defined a class called PrintTask . By calling the getResult method, the current thread stops until getting a result or throwing an exception. We call setResult method in PrintListener callback methods:Instead of defining a new class and using synchronized block and wait() and notify() mechanism, there is another alternative approach, using CompletableFuture Future class. But there was a problem with CompletableFuture , because the exception causing the failure in CompletableFuture will always be wrapped in a CompletionException, we should extract it from CompletionException and re throwing it: I tried using java.lang.reflect to implement 'callback' here's a sample: package StackOverflowQ443708 JavaCallBackTest; import java.util.concurrent.*; class MyTimer { ExecutorService EXE = Executors.newCachedThreadPool(); Executors.newSingleThreadExecutor(); public static void printLine () { System.out.println ("-----"); } public void SetTimer (final int timeout, final Object obj, final String methodName, final Object... args) { SetTimer (final int timeout, final Object obj, final String methodName, final Object... args) { SetTimer (final int timeout, final Object obj, final String methodName, final Object... args) { SetTimer (final int timeout, final Object obj, final String methodName, final Object... args) { EXE.execute ( new Runnable () { public void run () { Class c = obj.getClass (); else c = obj; System.out.println ("Wait for " + timeout + " seconds to invoke " + c.getSimpleName () + ":" + methodName + "T"); TimeUnit.SECONDS.sleep (timeout); } } ); } public void ShutdownTimer () { EXE.shutdown (); } } public classCallBackTest { public void onUserTimeout () { System.out.println ("onUserTimeout"); } public void onTestEnd () { System.out.println ("onTestEnd"); } public void onUserTimeout (); } public void NullParameterTest (String sParam, int iParam) { System.out.println ("NullParameterTest: String parameter=" + sParam + ", int parameter=" + iParam); } public static void main (String[] args) { CallBackTest test = new CallBackTest (); MyTimer timer = new MyTimer (); timer.SetTimer ((int)(Math.random () * 10), test, "onTestEnd"); timer.SetTimer ((int)(Math.random () * 10), test, "onUserTimeout"); timer.SetTimer ((int)(Math.random () * 10), test, "onTestEnd"); timer.SetTimer ((int)(Math.random () * 10), System.out, "println", "this is an argument of System.out.println() which is called by timer"); timer.SetTimer ((int)(Math.random () * 10), System.out, "println", "Should Not Pass Arguments"); // java.lang.NoSuchMethodException timer.SetTimer ((int)(Math.random () * 10), String.class, true, "format", "%d %X", 100, 200); // java.lang.NoSuchMethodException timer.SetTimer ((int)(Math.random () * 10), String.class, true, "format", "%d %X", new Object [] {100, 200}); timer.ShutdownTimer (); } }

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