[**Examples of GoF Design Patterns in Java's core libraries**](https://stackoverflow.com/questions/1673841/examples-of-gof-design-patterns-in-javas-core-libraries)

## [Creational patterns](http://en.wikipedia.org/wiki/Creational_pattern)

### [Abstract factory](http://en.wikipedia.org/wiki/Abstract_factory_pattern) (recognizeable by creational methods returning the factory itself which in turn can be used to create another abstract/interface type)

* [javax.xml.parsers.DocumentBuilderFactory#newInstance()](http://docs.oracle.com/javase/8/docs/api/javax/xml/parsers/DocumentBuilderFactory.html#newInstance--)
* [javax.xml.transform.TransformerFactory#newInstance()](http://docs.oracle.com/javase/8/docs/api/javax/xml/transform/TransformerFactory.html#newInstance--)
* [javax.xml.xpath.XPathFactory#newInstance()](http://docs.oracle.com/javase/8/docs/api/javax/xml/xpath/XPathFactory.html#newInstance--)

### [Builder](http://en.wikipedia.org/wiki/Builder_pattern) (recognizeable by creational methods returning the instance itself)

* [java.lang.StringBuilder#append()](http://docs.oracle.com/javase/8/docs/api/java/lang/StringBuilder.html#append-boolean-) (unsynchronized)
* [java.lang.StringBuffer#append()](http://docs.oracle.com/javase/8/docs/api/java/lang/StringBuffer.html#append-boolean-) (synchronized)
* [java.nio.ByteBuffer#put()](http://docs.oracle.com/javase/8/docs/api/java/nio/ByteBuffer.html#put-byte-) (also on [CharBuffer](http://docs.oracle.com/javase/8/docs/api/java/nio/CharBuffer.html#put-char-), [ShortBuffer](http://docs.oracle.com/javase/8/docs/api/java/nio/ShortBuffer.html#put-short-), [IntBuffer](http://docs.oracle.com/javase/8/docs/api/java/nio/IntBuffer.html#put-int-), [LongBuffer](http://docs.oracle.com/javase/8/docs/api/java/nio/LongBuffer.html#put-long-), [FloatBuffer](http://docs.oracle.com/javase/8/docs/api/java/nio/FloatBuffer.html#put-float-) and [DoubleBuffer](http://docs.oracle.com/javase/8/docs/api/java/nio/DoubleBuffer.html#put-double-))
* [javax.swing.GroupLayout.Group#addComponent()](http://docs.oracle.com/javase/8/docs/api/javax/swing/GroupLayout.Group.html#addComponent-java.awt.Component-)
* All implementations of [java.lang.Appendable](http://docs.oracle.com/javase/8/docs/api/java/lang/Appendable.html)

### [Factory method](http://en.wikipedia.org/wiki/Factory_method_pattern) (recognizeable by creational methods returning an implementation of an abstract/interface type)

* [java.util.Calendar#getInstance()](http://docs.oracle.com/javase/8/docs/api/java/util/Calendar.html#getInstance--)
* [java.util.ResourceBundle#getBundle()](http://docs.oracle.com/javase/8/docs/api/java/util/ResourceBundle.html#getBundle-java.lang.String-)
* [java.text.NumberFormat#getInstance()](http://docs.oracle.com/javase/8/docs/api/java/text/NumberFormat.html#getInstance--)
* [java.nio.charset.Charset#forName()](http://docs.oracle.com/javase/8/docs/api/java/nio/charset/Charset.html#forName-java.lang.String-)
* [java.net.URLStreamHandlerFactory#createURLStreamHandler(String)](http://docs.oracle.com/javase/8/docs/api/java/net/URLStreamHandlerFactory.html) (Returns singleton object per protocol)
* [java.util.EnumSet#of()](https://docs.oracle.com/javase/8/docs/api/java/util/EnumSet.html#of%28E%29)
* [javax.xml.bind.JAXBContext#createMarshaller()](https://docs.oracle.com/javase/8/docs/api/javax/xml/bind/JAXBContext.html#createMarshaller--) and other similar methods

### [Prototype](http://en.wikipedia.org/wiki/Prototype_pattern) (recognizeable by creational methods returning a different instance of itself with the same properties)

* [java.lang.Object#clone()](http://docs.oracle.com/javase/8/docs/api/java/lang/Object.html#clone--) (the class has to implement [java.lang.Cloneable](http://docs.oracle.com/javase/8/docs/api/java/lang/Cloneable.html))

### [Singleton](http://en.wikipedia.org/wiki/Singleton_pattern) (recognizeable by creational methods returning the same instance (usually of itself) everytime)

* [java.lang.Runtime#getRuntime()](http://docs.oracle.com/javase/8/docs/api/java/lang/Runtime.html#getRuntime--)
* [java.awt.Desktop#getDesktop()](http://docs.oracle.com/javase/8/docs/api/java/awt/Desktop.html#getDesktop--)
* [java.lang.System#getSecurityManager()](http://docs.oracle.com/javase/8/docs/api/java/lang/System.html#getSecurityManager--)

## [Structural patterns](http://en.wikipedia.org/wiki/Structural_pattern)

### [Adapter](http://en.wikipedia.org/wiki/Adapter_pattern) (recognizeable by creational methods taking an instance of different abstract/interface type and returning an implementation of own/another abstract/interface type which decorates/overrides the given instance)

* [java.util.Arrays#asList()](http://docs.oracle.com/javase/8/docs/api/java/util/Arrays.html#asList-T...-)
* [java.util.Collections#list()](https://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#list-java.util.Enumeration-)
* [java.util.Collections#enumeration()](https://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#enumeration-java.util.Collection-)
* [java.io.InputStreamReader(InputStream)](http://docs.oracle.com/javase/8/docs/api/java/io/InputStreamReader.html#InputStreamReader-java.io.InputStream-) (returns a Reader)
* [java.io.OutputStreamWriter(OutputStream)](http://docs.oracle.com/javase/8/docs/api/java/io/OutputStreamWriter.html#OutputStreamWriter-java.io.OutputStream-) (returns a Writer)
* [javax.xml.bind.annotation.adapters.XmlAdapter#marshal()](http://docs.oracle.com/javase/8/docs/api/javax/xml/bind/annotation/adapters/XmlAdapter.html#marshal-BoundType-) and [#unmarshal()](http://docs.oracle.com/javase/8/docs/api/javax/xml/bind/annotation/adapters/XmlAdapter.html#unmarshal-ValueType-)

### [Bridge](http://en.wikipedia.org/wiki/Bridge_pattern) (recognizeable by creational methods taking an instance of different abstract/interface type and returning an implementation of own abstract/interface type which delegates/uses the given instance)

* None comes to mind yet. A fictive example would be new LinkedHashMap(LinkedHashSet<K>, List<V>) which returns an unmodifiable linked map which doesn't clone the items, but uses them. The [java.util.Collections#newSetFromMap()](http://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#newSetFromMap-java.util.Map-) and [singletonXXX()](http://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#singleton-T-) methods however comes close.

### [Composite](http://en.wikipedia.org/wiki/Composite_pattern) (recognizeable by behavioral methods taking an instance of same abstract/interface type into a tree structure)

* [java.awt.Container#add(Component)](http://docs.oracle.com/javase/8/docs/api/java/awt/Container.html#add-java.awt.Component-) (practically all over Swing thus)
* [javax.faces.component.UIComponent#getChildren()](http://docs.oracle.com/javaee/7/api/javax/faces/component/UIComponent.html#getChildren--) (practically all over JSF UI thus)

### [Decorator](http://en.wikipedia.org/wiki/Decorator_pattern) (recognizeable by creational methods taking an instance of same abstract/interface type which adds additional behaviour)

* All subclasses of [java.io.InputStream](http://docs.oracle.com/javase/8/docs/api/java/io/InputStream.html), [OutputStream](http://docs.oracle.com/javase/8/docs/api/java/io/OutputStream.html), [Reader](http://docs.oracle.com/javase/8/docs/api/java/io/Reader.html) and [Writer](http://docs.oracle.com/javase/8/docs/api/java/io/Writer.html) have a constructor taking an instance of same type.
* [java.util.Collections](http://docs.oracle.com/javase/8/docs/api/java/util/Collections.html), the [checkedXXX()](http://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#checkedCollection-java.util.Collection-java.lang.Class-), [synchronizedXXX()](http://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#synchronizedCollection-java.util.Collection-) and [unmodifiableXXX()](http://docs.oracle.com/javase/8/docs/api/java/util/Collections.html#unmodifiableCollection-java.util.Collection-) methods.
* [javax.servlet.http.HttpServletRequestWrapper](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpServletRequestWrapper.html) and [HttpServletResponseWrapper](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpServletResponseWrapper.html)

### [Facade](http://en.wikipedia.org/wiki/Facade_pattern) (recognizeable by behavioral methods which internally uses instances of different independent abstract/interface types)

* [javax.faces.context.FacesContext](http://docs.oracle.com/javaee/7/api/javax/faces/context/FacesContext.html), it internally uses among others the abstract/interface types [LifeCycle](http://docs.oracle.com/javaee/7/api/javax/faces/lifecycle/Lifecycle.html), [ViewHandler](http://docs.oracle.com/javaee/7/api/javax/faces/application/ViewHandler.html), [NavigationHandler](http://docs.oracle.com/javaee/7/api/javax/faces/application/NavigationHandler.html) and many more without that the enduser has to worry about it (which are however overrideable by injection).
* [javax.faces.context.ExternalContext](http://docs.oracle.com/javaee/7/api/javax/faces/context/ExternalContext.html), which internally uses [ServletContext](http://docs.oracle.com/javaee/7/api/javax/servlet/ServletContext.html), [HttpSession](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpSession.html), [HttpServletRequest](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpServletRequest.html), [HttpServletResponse](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpServletResponse.html), etc.

### [Flyweight](http://en.wikipedia.org/wiki/Flyweight_pattern) (recognizeable by creational methods returning a cached instance, a bit the "multiton" idea)

* [java.lang.Integer#valueOf(int)](http://docs.oracle.com/javase/8/docs/api/java/lang/Integer.html#valueOf-int-) (also on [Boolean](http://docs.oracle.com/javase/8/docs/api/java/lang/Boolean.html#valueOf-boolean-), [Byte](http://docs.oracle.com/javase/8/docs/api/java/lang/Byte.html#valueOf-byte-), [Character](http://docs.oracle.com/javase/8/docs/api/java/lang/Character.html#valueOf-char-), [Short](http://docs.oracle.com/javase/8/docs/api/java/lang/Short.html#valueOf-short-), [Long](http://docs.oracle.com/javase/8/docs/api/java/lang/Long.html#valueOf-long-) and [BigDecimal](https://docs.oracle.com/javase/8/docs/api/java/math/BigDecimal.html#valueOf-long-int-))

### [Proxy](http://en.wikipedia.org/wiki/Proxy_pattern) (recognizeable by creational methods which returns an implementation of given abstract/interface type which in turn delegates/uses a different implementation of given abstract/interface type)

* [java.lang.reflect.Proxy](http://docs.oracle.com/javase/8/docs/api/java/lang/reflect/Proxy.html)
* [java.rmi.\*](http://docs.oracle.com/javase/8/docs/api/java/rmi/package-summary.html)
* [javax.ejb.EJB](http://docs.oracle.com/javaee/7/api/javax/ejb/EJB.html) ([explanation here](https://stackoverflow.com/questions/25514361/when-using-ejb-does-each-managed-bean-get-its-own-ejb-instance))
* [javax.inject.Inject](http://docs.oracle.com/javaee/7/api/javax/inject/Inject.html) ([explanation here](https://stackoverflow.com/questions/29651008/field-getobj-returns-all-nulls-on-injected-cdi-managed-beans-while-manually-i/29672591#29672591))
* [javax.persistence.PersistenceContext](http://docs.oracle.com/javaee/7/api/javax/persistence/PersistenceContext.html)

## [Behavioral patterns](http://en.wikipedia.org/wiki/Behavioral_pattern)

### [Chain of responsibility](http://en.wikipedia.org/wiki/Chain_of_responsibility_pattern) (recognizeable by behavioral methods which (indirectly) invokes the same method in another implementation of same abstract/interface type in a queue)

* [java.util.logging.Logger#log()](http://docs.oracle.com/javase/8/docs/api/java/util/logging/Logger.html#log-java.util.logging.Level-java.lang.String-)
* [javax.servlet.Filter#doFilter()](http://docs.oracle.com/javaee/7/api/javax/servlet/Filter.html#doFilter-javax.servlet.ServletRequest-javax.servlet.ServletResponse-javax.servlet.FilterChain-)

### [Command](http://en.wikipedia.org/wiki/Command_pattern) (recognizeable by behavioral methods in an abstract/interface type which invokes a method in an implementation of a different abstract/interface type which has been encapsulated by the command implementation during its creation)

* All implementations of [java.lang.Runnable](http://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html)
* All implementations of [javax.swing.Action](http://docs.oracle.com/javase/8/docs/api/javax/swing/Action.html)

### [Interpreter](http://en.wikipedia.org/wiki/Interpreter_pattern) (recognizeable by behavioral methods returning a structurally different instance/type of the given instance/type; note that parsing/formatting is not part of the pattern, determining the pattern and how to apply it is)

* [java.util.Pattern](http://docs.oracle.com/javase/8/docs/api/java/util/regex/Pattern.html)
* [java.text.Normalizer](http://docs.oracle.com/javase/8/docs/api/java/text/Normalizer.html)
* All subclasses of [java.text.Format](http://docs.oracle.com/javase/8/docs/api/java/text/Format.html)
* All subclasses of [javax.el.ELResolver](http://docs.oracle.com/javaee/7/api/javax/el/ELResolver.html)

### [Iterator](http://en.wikipedia.org/wiki/Iterator_pattern) (recognizeable by behavioral methods sequentially returning instances of a different type from a queue)

* All implementations of [java.util.Iterator](http://docs.oracle.com/javase/8/docs/api/java/util/Iterator.html) (thus among others also [java.util.Scanner](http://docs.oracle.com/javase/8/docs/api/java/util/Scanner.html)!).
* All implementations of [java.util.Enumeration](http://docs.oracle.com/javase/8/docs/api/java/util/Enumeration.html)

### [Mediator](http://en.wikipedia.org/wiki/Mediator_pattern) (recognizeable by behavioral methods taking an instance of different abstract/interface type (usually using the command pattern) which delegates/uses the given instance)

* [java.util.Timer](http://docs.oracle.com/javase/8/docs/api/java/util/Timer.html) (all scheduleXXX() methods)
* [java.util.concurrent.Executor#execute()](http://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Executor.html#execute-java.lang.Runnable-)
* [java.util.concurrent.ExecutorService](http://docs.oracle.com/javase/8/docs/api/java/util/concurrent/ExecutorService.html) (the invokeXXX() and submit() methods)
* [java.util.concurrent.ScheduledExecutorService](http://docs.oracle.com/javase/8/docs/api/java/util/concurrent/ScheduledExecutorService.html) (all scheduleXXX() methods)
* [java.lang.reflect.Method#invoke()](http://docs.oracle.com/javase/8/docs/api/java/lang/reflect/Method.html#invoke-java.lang.Object-java.lang.Object...-)

### [Memento](http://en.wikipedia.org/wiki/Memento_pattern) (recognizeable by behavioral methods which internally changes the state of the whole instance)

* [java.util.Date](http://docs.oracle.com/javase/8/docs/api/java/util/Date.html) (the setter methods do that, Date is internally represented by a long value)
* All implementations of [java.io.Serializable](http://docs.oracle.com/javase/8/docs/api/java/io/Serializable.html)
* All implementations of [javax.faces.component.StateHolder](http://docs.oracle.com/javaee/7/api/javax/faces/component/StateHolder.html)

### [Observer (or Publish/Subscribe)](http://en.wikipedia.org/wiki/Observer_pattern) (recognizeable by behavioral methods which invokes a method on an instance of another abstract/interface type, depending on own state)

* [java.util.Observer](http://docs.oracle.com/javase/8/docs/api/java/util/Observer.html)/[java.util.Observable](http://docs.oracle.com/javase/8/docs/api/java/util/Observable.html) (rarely used in real world though)
* All implementations of [java.util.EventListener](http://docs.oracle.com/javase/8/docs/api/java/util/EventListener.html) (practically all over Swing thus)
* [javax.servlet.http.HttpSessionBindingListener](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpSessionBindingListener.html)
* [javax.servlet.http.HttpSessionAttributeListener](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpSessionAttributeListener.html)
* [javax.faces.event.PhaseListener](http://docs.oracle.com/javaee/7/api/javax/faces/event/PhaseListener.html)

### [State](http://en.wikipedia.org/wiki/State_pattern) (recognizeable by behavioral methods which changes its behaviour depending on the instance's state which can be controlled externally)

* [javax.faces.lifecycle.LifeCycle#execute()](http://docs.oracle.com/javaee/7/api/javax/faces/lifecycle/Lifecycle.html#execute-javax.faces.context.FacesContext-) (controlled by [FacesServlet](http://docs.oracle.com/javaee/7/api/javax/faces/webapp/FacesServlet.html), the behaviour is dependent on current phase (state) of JSF lifecycle)

### [Strategy](http://en.wikipedia.org/wiki/Strategy_pattern) (recognizeable by behavioral methods in an abstract/interface type which invokes a method in an implementation of a different abstract/interface type which has been passed-in as method argument into the strategy implementation)

* [java.util.Comparator#compare()](http://docs.oracle.com/javase/8/docs/api/java/util/Comparator.html#compare-T-T-), executed by among others Collections#sort().
* [javax.servlet.http.HttpServlet](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpServlet.html), the service() and all doXXX() methods take HttpServletRequest and HttpServletResponse and the implementor has to process them (and not to get hold of them as instance variables!).
* [javax.servlet.Filter#doFilter()](http://docs.oracle.com/javaee/7/api/javax/servlet/Filter.html#doFilter-javax.servlet.ServletRequest-javax.servlet.ServletResponse-javax.servlet.FilterChain-)

### [Template method](http://en.wikipedia.org/wiki/Template_method_pattern) (recognizeable by behavioral methods which already have a "default" behaviour definied by an abstract type)

* All non-abstract methods of [java.io.InputStream](http://docs.oracle.com/javase/8/docs/api/java/io/InputStream.html), [java.io.OutputStream](http://docs.oracle.com/javase/8/docs/api/java/io/OutputStream.html), [java.io.Reader](http://docs.oracle.com/javase/8/docs/api/java/io/Reader.html) and [java.io.Writer](http://docs.oracle.com/javase/8/docs/api/java/io/Writer.html).
* All non-abstract methods of [java.util.AbstractList](http://docs.oracle.com/javase/8/docs/api/java/util/AbstractList.html), [java.util.AbstractSet](http://docs.oracle.com/javase/8/docs/api/java/util/AbstractSet.html) and [java.util.AbstractMap](http://docs.oracle.com/javase/8/docs/api/java/util/AbstractMap.html).
* [javax.servlet.http.HttpServlet](http://docs.oracle.com/javaee/7/api/javax/servlet/http/HttpServlet.html), all the doXXX() methods by default sends a HTTP 405 "Method Not Allowed" error to the response. You're free to implement none or any of them.

### [Visitor](http://en.wikipedia.org/wiki/Visitor_pattern) (recognizeable by two different abstract/interface types which has methods definied which takes each the other abstract/interface type; the one actually calls the method of the other and the other executes the desired strategy on it)

* [javax.lang.model.element.AnnotationValue](http://docs.oracle.com/javase/8/docs/api/javax/lang/model/element/AnnotationValue.html) and [AnnotationValueVisitor](http://docs.oracle.com/javase/8/docs/api/javax/lang/model/element/AnnotationValueVisitor.html)
* [javax.lang.model.element.Element](http://docs.oracle.com/javase/8/docs/api/javax/lang/model/element/Element.html) and [ElementVisitor](http://docs.oracle.com/javase/8/docs/api/javax/lang/model/element/ElementVisitor.html)
* [javax.lang.model.type.TypeMirror](http://docs.oracle.com/javase/8/docs/api/javax/lang/model/type/TypeMirror.html) and [TypeVisitor](http://docs.oracle.com/javase/8/docs/api/javax/lang/model/type/TypeVisitor.html)
* [java.nio.file.FileVisitor](http://docs.oracle.com/javase/8/docs/api/java/nio/file/FileVisitor.html) and [SimpleFileVisitor](http://docs.oracle.com/javase/8/docs/api/java/nio/file/SimpleFileVisitor.html)
* [javax.faces.component.visit.VisitContext](http://docs.oracle.com/javaee/7/api/javax/faces/component/visit/VisitContext.html) and [VisitCallback](http://docs.oracle.com/javaee/7/api/javax/faces/component/visit/VisitCallback.html)