

External Dependencies of Java Artifacts with Neo4j

References

- [jqassistant](#)
- [py2neo](#)

External Package Usage

External Package

A package is categorized as "external" if it is utilized as a dependency, or if any of its enclosed types are used as dependencies, but the code within it has not been analyzed (missing bytecode). This also applies to all build-in Java types, but they are explicitly filtered out here.

External annotation dependency

The aforementioned classification encompasses external annotation dependencies as well. These dependencies introduce significantly less coupling and are not indispensable for compiling code. Without the external annotation the code would most probably behave differently. Hence, they are included in the first more overall and general tables and then left out in the later more specific ones.

Table 1 - Top 20 most used external packages overall

- *externalPackageName* identifies the external package as described above
- *numberOfExternalTypeCaller* refers to the distinct types that make use of the external package
- *numberOfExternalTypeCalls* includes every invocation or reference to the types in the external package
- *allTypes* represents the total count of all analyzed types in general
- *externalTypeNames* contains a list of actually utilized types of the external package

	externalPackageName	numberOfExternalTypeCaller	numberOfExternalTypeCalls	allTypes	externalTypeNames
0	javax.annotation	323	1404	2493	[Nonnull, Nullable, PreDestroy]
1	org.slf4j	190	529	2493	[Logger, LoggerFactory]
2	javax.persistence	78	339	2493	[IdClass, MappedSuperclass, Id, Table, Index, ...]
3	jakarta.persistence	69	327	2493	[MappedSuperclass, IdClass, Id, EntityExistsEx...]
4	org.hamcrest	59	490	2493	[Matcher, StringDescription, CoreMatchers, Des...]
5	com.fasterxml.jackson.annotation	54	84	2493	[JsonProperty, JsonGetter, JsonTypeInfo\$Id, Js...]
6	org.quartz	37	226	2493	[JobDataMap, JobDetail, JobExecutionException, ...]
7	reactor.core.publisher	33	149	2493	[Mono, Flux, FluxSink\$OverflowStrategy, FluxSi...]
8	com.fasterxml.jackson.databind	15	73	2493	[JsonDeserializer, DeserializationContext, Obj...]
9	org.reactivestreams	13	41	2493	[Publisher]
10	com.thoughtworks.xstream.io	9	46	2493	[HierarchicalStreamReader, HierarchicalStreamW...]
11	javax.cache.event	8	34	2493	[CacheEntryEventFilter, CacheEntryEvent, Cache...]
12	com.lmax.disruptor	8	24	2493	[RingBuffer, EventHandler, LifecycleAware, Wai...]
13	javax.sql	6	24	2493	[DataSource]
14	com.thoughtworks.xstream.converters	6	12	2493	[MarshallingContext, UnmarshallingContext]
15	nu.xom	5	16	2493	[Document, ParsingException, Builder]
16	net.sf.ehcache	5	63	2493	[Ehcache, CacheException, Element]
17	com.thoughtworks.xstream.mapper	5	10	2493	[Mapper, CannotResolveClassException]
18	javax.validation	5	22	2493	[ValidatorFactory, ConstraintViolation, Valida...]
19	jakarta.validation	5	22	2493	[ValidatorFactory, Validation, ConstraintViola...]

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External Package Usage

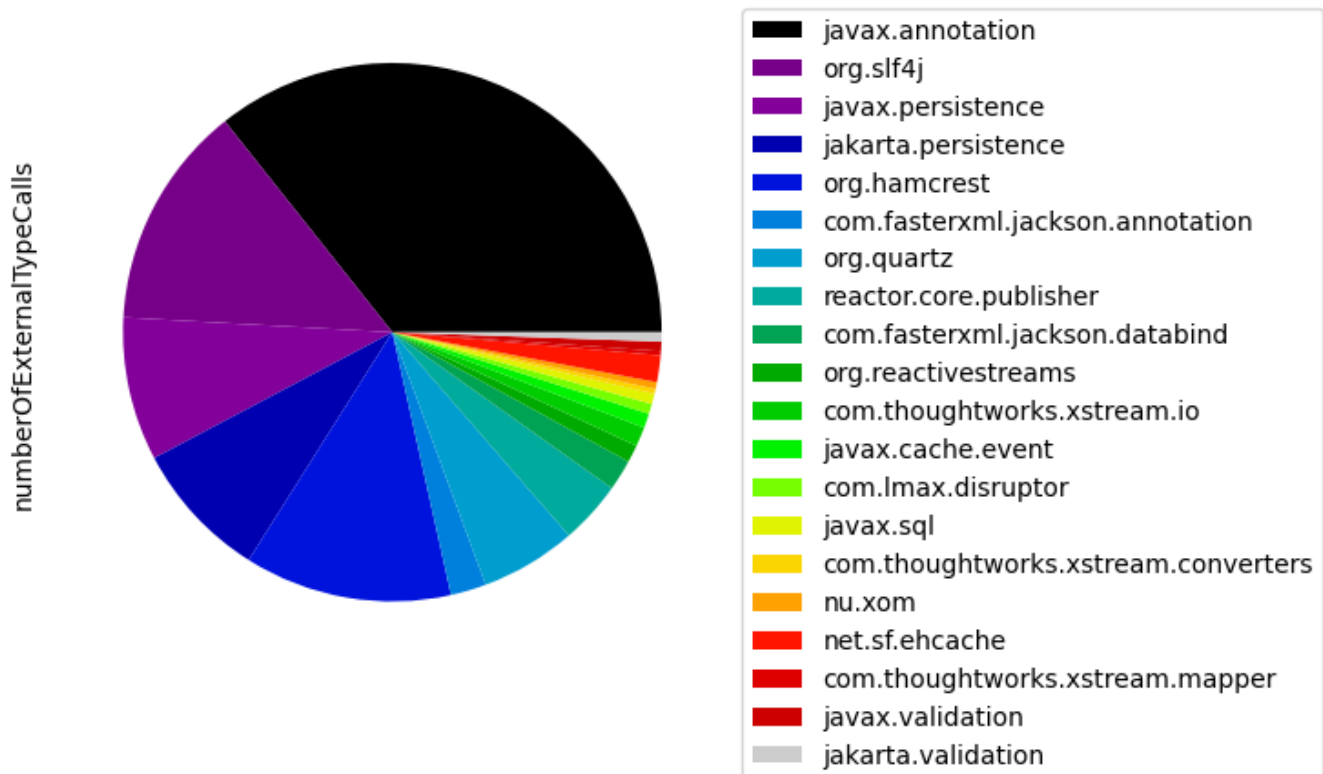


Table 2 - Top 20 least used external packages overall

- *externalPackageName* identifies the external package as described above

- *numberOfExternalTypeCalls* includes every invocation or reference to the types in the external package

This table identifies external packages that aren't used very often. This could help to find libraries that aren't actually needed or maybe easily replaced. Some of them might be used only in very few spots in the code on purpose and can't be replaced. This needs to be decided on a case-by-case basis.

	externalPackageName	numberOfExternalTypeCalls
0	org.junit.rules	1
1	org.junit.jupiter.api	1
2	javax.xml.stream	2
3	org.testcontainers.containers.wait.strategy	2
4	com.fasterxml.jackson.datatype.jsr310	2
5	org.quartz.impl.matchers	2
6	reactor.core	2
7	org.junit.runner	2
8	com.fasterxml.jackson.databind.type	3
9	reactor.util.concurrent	3
10	com.fasterxml.jackson.databind.module	3
11	org.dom4j.io	3
12	com.fasterxml.jackson.databind.jsontype	3
13	org.junit.jupiter.api.extension	6
14	reactor.util.context	7
15	com.thoughtworks.xstream.converters.collections	7
16	org.junit.runners.model	8
17	org.testcontainers.containers	8
18	net.sf.ehcache.event	9
19	com.thoughtworks.xstream.mapper	10

Table 3 - External usage per artifact

- *artifactName* is used to group the the external package usage per artifact for a more detailed analysis.
- *externalPackageName* identifies the external package as described above
- *numberOfExternalTypeCaller* refers to the distinct types that make use of the external package
- *numberOfExternalTypeCalls* includes every invocation or reference to the types in the external package
- *numberOfTypesInArtifact* represents the total count of all analyzed types for the artifact
- *externalTypeNames* contains a list of actually utilized types of the external package

	artifactName	externalPackageName	numberOfExternalTypeCaller	numberOfExternalTypeCalls	numberOfTypesInArtifact	externalTypeNames
0	axon-configuration-4.7.5	javax.annotation	12	104	39	[Nonnull]
1	axon-configuration-4.7.5	org.slf4j	9	28	39	[LoggerFactory, Logger]
2	axon-disruptor-4.7.5	org.slf4j	11	20	22	[Logger, LoggerFactory]
3	axon-disruptor-4.7.5	com.lmax.disruptor	8	24	22	[RingBuffer, EventHandler, LifecycleAware, Exc...
4	axon-disruptor-4.7.5	javax.annotation	5	18	22	[Nonnull]
...
61	axon-test-4.7.5	org.testcontainers.containers.wait.strategy	2	2	85	[Wait]
62	axon-test-4.7.5	org.junit.runners.model	2	8	85	[Statement]
63	axon-test-4.7.5	org.junit.jupiter.api	1	1	85	[Assertions]
64	axon-test-4.7.5	org.junit.rules	1	1	85	[TestRule]
65	axon-test-4.7.5	org.junit.runner	1	2	85	[Description]

66 rows × 6 columns

Table 4 - External usage per artifact and package

	artifactName	fullPackageName	externalPackageName	numberOfExternalTypeCaller	numberOfExternalTypeCalls	numberOfTypesInArtifact
0	axon-test-4.7.5	org.axonframework.test.matchers	org.hamcrest	36	180	
1	axon-messaging-4.7.5	org.axonframework.queryhandling	reactor.core.publisher	26	115	
2	axon-messaging-4.7.5	org.axonframework.eventhandling.scheduling.quartz	org.quartz	19	95	
3	axon-messaging-4.7.5	org.axonframework.deadline.quartz	org.quartz	18	131	
4	axon-messaging-4.7.5	org.axonframework.eventhandling	org.slf4j	15	55	
...
118	axon-modelling-4.7.5	org.axonframework.modelling.saga.repository.jdbc	javax.sql	1	2	
119	axon-modelling-4.7.5	org.axonframework.modelling.saga.repository.jpa	javax.persistence	1	2	
120	axon-test-4.7.5	org.axonframework.test.aggregate	org.junit.rules	1	1	
121	axon-test-4.7.5	org.axonframework.test.aggregate	org.junit.runner	1	2	
122	axon-test-4.7.5	org.axonframework.test.saga	org.junit.jupiter.api	1	1	

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Table 5 - Top 20 external package usage per type

	artifactName	fullPackageName	typeName	numberOfExternalTypeCaller	numberOfExternalType
0	axon-messaging-4.7.5	org.axonframework.serialization.json	JacksonSerializer	9	
1	axon-messaging-4.7.5	org.axonframework.serialization.xml	XStreamSerializer	7	
2	axon-disruptor-4.7.5	org.axonframework.disruptor.commandhandling	DisruptorCommandBus	6	
3	axon-messaging-4.7.5	org.axonframework.deadline.quartz	QuartzDeadlineManager	13	
4	axon-messaging-4.7.5	org.axonframework.messaging.responsetypes	MultipleInstancesResponseType	7	
5	axon-messaging-4.7.5	org.axonframework.queryhandling	SimpleQueryBus	6	
6	axon-messaging-4.7.5	org.axonframework.queryhandling	SimpleQueryUpdateEmitter	13	
7	axon-messaging-4.7.5	org.axonframework.serialization	GapAwareTrackingTokenConverter\$ReflectivelyCon...	6	
8	axon-messaging-4.7.5	org.axonframework.serialization	GapAwareTrackingTokenConverter	6	
9	axon-messaging-4.7.5	org.axonframework.serialization	AbstractXStreamSerializer\$MetaDataConverter	6	
10	axon-messaging-4.7.5	org.axonframework.serialization.json	MetaDataDeserializer	6	
11	axon-disruptor-4.7.5	org.axonframework.disruptor.commandhandling	BlacklistDetectingCallback	4	
12	axon-disruptor-4.7.5	org.axonframework.disruptor.commandhandling	DisruptorCommandBus\$ExceptionHandler	3	
13	axon-eventsourcing-4.7.5	org.axonframework.eventsourcing.eventstore.jpa	JpaEventStorageEngine	6	
14	axon-eventsourcing-4.7.5	org.axonframework.eventsourcing.eventstore.jpa	SQLErrorCodesResolver	4	
15	axon-eventsourcing-4.7.5	org.axonframework.eventsourcing.eventstore.leg...	SQLErrorCodesResolver	4	
16	axon-eventsourcing-4.7.5	org.axonframework.eventsourcing.eventstore.leg...	JpaEventStorageEngine	6	
17	axon-messaging-4.7.5	org.axonframework.deadline.jobrunr	JobRunrDeadlineManager	5	
18	axon-messaging-4.7.5	org.axonframework.eventhandling.deadletter.jpa	JpaSequencedDeadLetterQueue	7	
19	axon-messaging-4.7.5	org.axonframework.eventhandling.deadletter.leg...	JpaSequencedDeadLetterQueue	7	

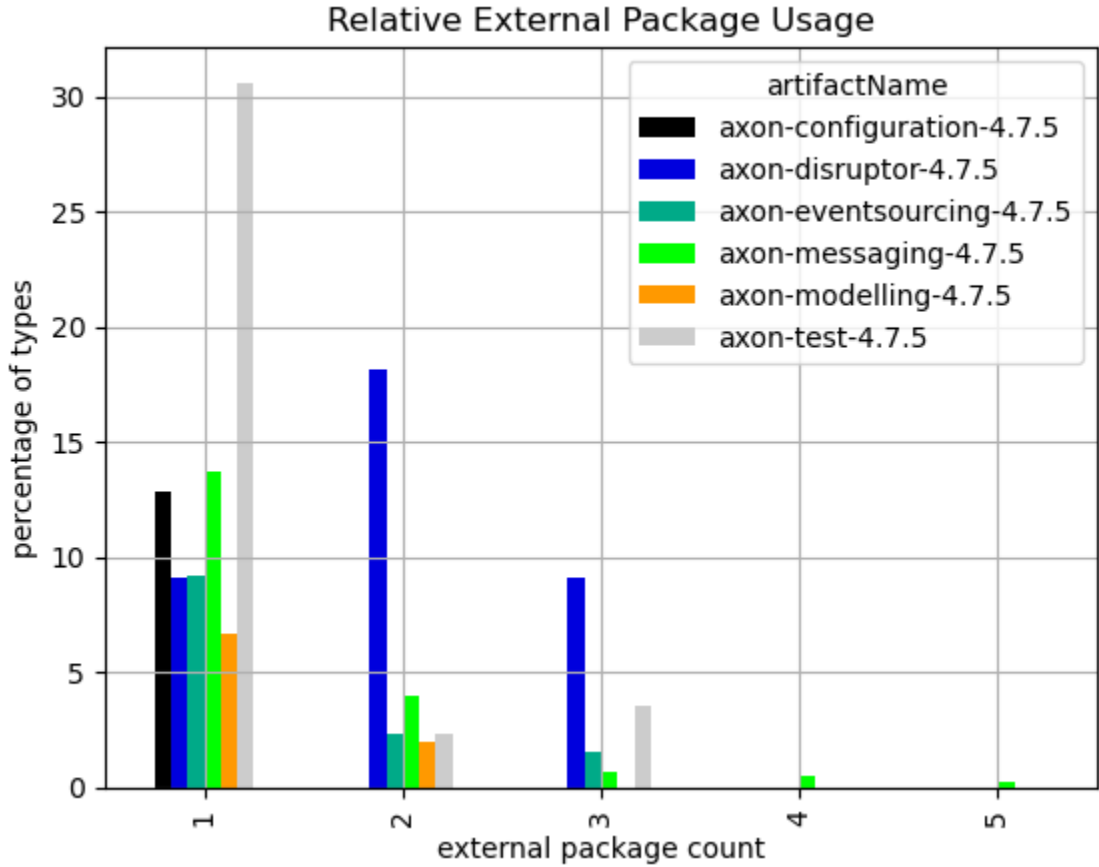
Table 6 - External package usage distribution per type

The table shown here only includes the first 20 rows at most which typically represents the most significant entries. Have a look above to find out which types have the highest external package dependency usage.

	artifactName	artifactTypes	numberOfExternalPackages	numberOfTypes	numberOfTypesPercentage
0	axon-configuration-4.7.5	39	1	5	12.820513
1	axon-disruptor-4.7.5	22	1	2	9.090909
2	axon-disruptor-4.7.5	22	2	4	18.181818
3	axon-disruptor-4.7.5	22	3	2	9.090909
4	axon-eventsourcing-4.7.5	130	1	12	9.230769
5	axon-eventsourcing-4.7.5	130	2	3	2.307692
6	axon-eventsourcing-4.7.5	130	3	2	1.538462
7	axon-messaging-4.7.5	729	1	100	13.717421
8	axon-messaging-4.7.5	729	2	29	3.978052
9	axon-messaging-4.7.5	729	3	5	0.685871
10	axon-messaging-4.7.5	729	4	4	0.548697
11	axon-messaging-4.7.5	729	5	2	0.274348
12	axon-modelling-4.7.5	149	1	10	6.711409
13	axon-modelling-4.7.5	149	2	3	2.013423
14	axon-test-4.7.5	85	1	26	30.588235
15	axon-test-4.7.5	85	2	2	2.352941
16	axon-test-4.7.5	85	3	3	3.529412

artifactName	axon-configuration-4.7.5	axon-disruptor-4.7.5	axon-eventsourcing-4.7.5	axon-messaging-4.7.5	axon-modelling-4.7.5	axon-test-4.7.5
numberOfExternalPackages						
1	12.820513	9.090909	9.230769	13.717421	6.711409	30.588235
2	0.000000	18.181818	2.307692	3.978052	2.013423	2.352941
3	0.000000	9.090909	1.538462	0.685871	0.000000	3.529412
4	0.000000	0.000000	0.000000	0.548697	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.274348	0.000000	0.000000

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Maven POMs

Table 7 - Maven POMs and their declared dependencies

	pom.artifactId	pom.name	scope	dependency.optional	dependentArtifact.group	dependentArtifact.name
0	axon-configuration	Axon Framework - Configuration	test	False	org.quartz-scheduler	quartz
1	axon-configuration	Axon Framework - Configuration	test	False	jakarta.persistence	jakarta.persistence-api
2	axon-configuration	Axon Framework - Configuration	test	False	org.hibernate	hibernate-core-jakarta
3	axon-configuration	Axon Framework - Configuration	default	False	\${project.groupId}	axon-disruptor
4	axon-configuration	Axon Framework - Configuration	test	False	org.hsqldb	hsqldb
...
104	axon-test	Axon Framework - Test Fixtures	provided	False	com.google.code.findbugs	jsr305
105	axon-test	Axon Framework - Test Fixtures	test	False	org.springframework	spring-beans
106	axon-test	Axon Framework - Test Fixtures	default	False	\${project.groupId}	axon-eventsourcing
107	axon-test	Axon Framework - Test Fixtures	test	False	jakarta.persistence	jakarta.persistence-api
108	axon-test	Axon Framework - Test Fixtures	default	True	org.hamcrest	hamcrest

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