Internal Dependencies

References

- Analyze java package metrics in a graph database
- Calculate metrics
- Neo4j Python Driver

Artifacts

List the artifacts this notebook is based on. Different sorting variations help finding artifacts by their features and support larger code bases where the list of all artifacts gets too long.

Only the top 30 entries are shown. The whole table can be found in the following CSV report: `List_all_Java_artifacts`

Table 1a - Top 30 artifacts with the highest package count

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-messaging-4.9.3.jar	64	786	5	0
1	axon-modelling-4.9.3.jar	10	156	4	1
2	axon-eventsourcing-4.9.3.jar	9	133	3	2
3	axon-test-4.9.3.jar	8	87	0	3
4	axon-configuration-4.9.3.jar	1	40	0	4
5	axon-disruptor-4.9.3.jar	1	22	1	3

Table 1b - Top 30 artifacts with the highest type count

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-messaging-4.9.3.jar	64	786	5	0
1	axon-modelling-4.9.3.jar	10	156	4	1
2	axon-eventsourcing-4.9.3.jar	9	133	3	2
3	axon-test-4.9.3.jar	8	87	0	3
4	axon-configuration-4.9.3.jar	1	40	0	4
5	axon-disruptor-4.9.3.jar	1	22	1	3

Table 1c - Top 30 artifacts with the highest number of incoming dependencies

The following table lists the top 30 artifacts that are used the most by other artifacts (highest count of incoming dependencies, highest in-degree).

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-messaging-4.9.3.jar	64	786	5	0
1	axon-modelling-4.9.3.jar	10	156	4	1
2	axon-eventsourcing-4.9.3.jar	9	133	3	2
3	axon-disruptor-4.9.3.jar	1	22	1	3
4	axon-configuration-4.9.3.jar	1	40	0	4
5	axon-test-4.9.3.jar	8	87	0	3

Table 1d - Top 30 artifacts with the highest number of outgoing dependencies

The following table lists the top 30 artifacts that are depending on the highest number of other artifacts (highest count of outgoing dependencies, highest out-degree).

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-configuration-4.9.3.jar	1	40	0	4
1	axon-disruptor-4.9.3.jar	1	22	1	3
2	axon-test-4.9.3.jar	8	87	0	3
3	axon-eventsourcing-4.9.3.jar	9	133	3	2
4	axon-modelling-4.9.3.jar	10	156	4	1
5	axon-messaging-4.9.3.jar	64	786	5	0

Table 1e - Top 30 artifacts with the lowest package count

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-configuration-4.9.3.jar	1	40	0	4
1	axon-disruptor-4.9.3.jar	1	22	1	3
2	axon-test-4.9.3.jar	8	87	0	3
3	axon-eventsourcing-4.9.3.jar	9	133	3	2
4	axon-modelling-4.9.3.jar	10	156	4	1
5	axon-messaging-4.9.3.jar	64	786	5	0

Table 1f - Top 30 artifacts with the lowest type count

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-disruptor-4.9.3.jar	1	22	1	3
1	axon-configuration-4.9.3.jar	1	40	0	4
2	axon-test-4.9.3.jar	8	87	0	3
3	axon-eventsourcing-4.9.3.jar	9	133	3	2
4	axon-modelling-4.9.3.jar	10	156	4	1
5	axon-messaging-4.9.3.jar	64	786	5	0

Table 1g - Top 30 artifacts with the lowest number of incoming dependencies

The following table lists the top 30 artifacts that are used the least by other artifacts (lowest count of incoming dependencies, lowest in-degree).

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-configuration-4.9.3.jar	1	40	0	4
1	axon-test-4.9.3.jar	8	87	0	3
2	axon-disruptor-4.9.3.jar	1	22	1	3
3	axon-eventsourcing-4.9.3.jar	9	133	3	2
4	axon-modelling-4.9.3.jar	10	156	4	1
5	axon-messaging-4.9.3.jar	64	786	5	0

Table 1h - Top 30 artifacts with the lowest number of outgoing dependencies

The following table lists the top 30 artifacts that are depending on the lowest number of other artifacts (lowest count of outgoing dependencies, lowest out-degree).

	artifactName	packages	types	incomingDependencies	outgoingDependencies
0	axon-messaging-4.9.3.jar	64	786	5	0
1	axon-modelling-4.9.3.jar	10	156	4	1
2	axon-eventsourcing-4.9.3.jar	9	133	3	2
3	axon-disruptor-4.9.3.jar	1	22	1	3
4	axon-test-4.9.3.jar	8	87	0	3
5	axon-configuration-4.9.3.jar	1	40	0	4

Cyclic Dependencies

Cyclic dependencies occur when one package uses a class of another package and vice versa. These dependencies can lead to problems when one of these packages needs to be changed.

Table 2a - Cyclic Dependencies Overview

Show the top 40 cyclic dependencies sorted by the most promising to resolve first. This is done by calculating the number of forward dependencies (first cycle participant to second cycle participant) in relation to backward dependencies (second cycle participant back to first cycle participant). The higher this rate (approaching 1), the easier it should be to resolve the cycle by focussing on the few backward dependencies.

Only the top 40 entries are shown. The whole table can be found in the following CSV report: `Cyclic_Dependencies`

Columns:

- *artifactName* identifies the artifact of the first participant of the cycle
- *packageName* identifies the package of the first participant of the cycle
- *dependentArtifactName* identifies the artifact of the second participant of the cycle

- *dependentPackageName* identifies the package of the second participant of the cycle
- *forwardToBackwardBalance* is between 0 and 1. High for many forward and few backward dependencies.
- *numberForward* contains the number of dependencies from the first participant of the cycle to the second one
- *numberBackward* contains the number of dependencies from the second participant of the cycle back to the first one
- *someForwardDependencies* lists some forward dependencies in the text format "type1 -> type2"
- *backwardDependencies* lists the backward dependencies in the format "type1 <- type2" that are recommended to get resolved

	artifactName	packageName	dependentArtifactName	dependentPackageName	forwardToBackwardBalance
0	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	0.900000
1	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	0.882353
2	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.tracing	0.875000
3	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging	0.857143
4	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging.annotation	0.840000
5	axon-messaging-4.9.3	org.axonframework.deadline	axon-messaging-4.9.3	org.axonframework.tracing	0.800000
6	axon-messaging-4.9.3	org.axonframework.commandhandling	axon-messaging-4.9.3	org.axonframework.tracing	0.777778
7	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore	0.777778
8	axon-messaging-4.9.3	org.axonframework.commandhandling.callbacks	axon-messaging-4.9.3	org.axonframework.commandhandling	0.733333
9	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.serialization	0.647059
10	axon-messaging-4.9.3	org.axonframework.messaging.unitofwork	axon-messaging-4.9.3	org.axonframework.messaging	0.647059
11	axon-messaging-4.9.3	org.axonframework.eventhandling.async	axon-messaging-4.9.3	org.axonframework.eventhandling	0.538462
12	axon-messaging-4.9.3	org.axonframework.eventhandling.replay	axon-messaging-4.9.3	org.axonframework.eventhandling	0.454545
13	axon-messaging-4.9.3	org.axonframework.serialization.upcasting.event	axon-messaging-4.9.3	org.axonframework.eventhandling	0.333333
14	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	0.317073
15	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.eventhandling.tokenstore	0.285714
16	axon-modelling-4.9.3	org.axonframework.modelling.command.inspection	axon-modelling-4.9.3	org.axonframework.modelling.command	0.250000
17	axon-messaging-4.9.3	org.axonframework.queryhandling.registration	axon-messaging-4.9.3	org.axonframework.queryhandling	0.250000
18	axon-messaging-4.9.3	org.axonframework.messaging	axon-messaging-4.9.3	org.axonframework.serialization	0.238095
19	axon-messaging-4.9.3	org.axonframework.messaging.annotation	axon-messaging-4.9.3	org.axonframework.messaging.interceptors	0.200000
20	axon-modelling-4.9.3	org.axonframework.modelling.saga	axon-modelling-4.9.3	org.axonframework.modelling.saga.metamodel	0.142857
21	axon-messaging-4.9.3	org.axonframework.commandhandling.distributed....	axon-messaging-4.9.3	org.axonframework.commandhandling.distributed	0.076923

Table 2b - Cyclic Dependencies Break Down

Lists packages with cyclic dependencies with every dependency in a separate row sorted by the most promising dependency first.

Only the top 40 entries are shown. The whole table can be found in the following CSV report:
`Cyclic_Dependencies_Breakdown`

Columns in addition to Table 2a:

- *dependency* shows the cycle dependency in the text format "type1 -> type2" (forward) or "type2<-type1" (backward)

	artifactName	packageName	dependentArtifactName	dependentPackageName	dependency	for
0	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	SubscribingEventProcessor$Builder->SpanFactory	
1	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventProcessor$Builder->NoOpSpanFactory	
2	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventBus->SpanScope	
3	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventBus$Builder->SpanFactory	
4	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	EventBusSpanFactory->Span	
5	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventProcessor$Builder->SpanFactory	
6	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventProcessorSpanFactory->Span	
7	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventBus->Span	
8	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	EventMessage<-NestingSpanFactory	
9	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	EventProcessorSpanFactory->Span	
10	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventProcessorSpanFactory$Builder->Span...	
11	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	TrackingEventProcessor$Builder->SpanFactory	
12	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventBusSpanFactory->Span	
13	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventBusSpanFactory->SpanFactory	
14	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventProcessorSpanFactory->SpanFactory	
15	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventBus$Builder->NoOpSpanFactory	
16	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventProcessorSpanFactory->NoOpSpanFact...	
17	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultEventBusSpanFactory$Builder->SpanFactory	
18	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	AbstractEventProcessor->Span	
19	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	SimpleEventBus$Builder->SpanFactory	
20	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	GenericSubscriptionQueryMessage->ResponseType	
21	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	GenericStreamingQueryMessage->ResponseType	
22	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	QueryResponseMessage<-ConvertingResponseMessage	
23	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	QueryMessage->ResponseType	
24	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	SimpleQueryUpdateEmitter->MultipleInstancesRes...	
25	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	SimpleQueryUpdateEmitter->ResponseType	

	artifactName	packageName	dependentArtifactName	dependentPackageName	dependency	for
26	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	GenericQueryMessage->ResponseType	
27	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	SimpleQueryBus->ResponseType	
28	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	SubscriptionQueryMessage->ResponseType	
29	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	StreamingQueryMessage->ResponseType	
30	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	QueryGateway->ResponseTypes	
31	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	GenericStreamingQueryMessage->PublisherRespons...	
32	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	DefaultQueryGateway->ResponseType	
33	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	QueryGateway->ResponseType	
34	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	SimpleQueryUpdateEmitter->PublisherResponseType	
35	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	QuerySubscription->ResponseType	
36	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	SimpleQueryUpdateEmitter->OptionalResponseType	
37	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.tracing	SimpleQueryUpdateEmitter->Span	
38	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.tracing	DefaultQueryUpdateEmitterSpanFactory$Builder->...	
39	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.tracing	QueryUpdateEmitterSpanFactory->Span	

Table 2c - Cyclic Dependencies Break Down - Backward Dependencies Only

Lists packages with cyclic dependencies with every dependency in a separate row sorted by the most promising dependency first. This table only contains the backward dependencies from the second participant of the cycle back to the first one that are the most promising to resolve.

Only the top 40 entries are shown. The whole table can be found in the following CSV report: `Cyclic_Dependencies_Breakdown_BackwardOnly`

	artifactName	packageName	dependentArtifactName	dependentPackageName	depe
0	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.tracing	EventMessage<-NestingSpan
1	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.messaging.responsetypes	QueryResponseMes ConvertingResponseM
2	axon-messaging-4.9.3	org.axonframework.queryhandling	axon-messaging-4.9.3	org.axonframework.tracing	QueryMessage<-Sp
3	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging	Tracking StreamableMessage
4	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging	DomainEventMessage<-H
5	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging	EventMessage<-H
6	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging.annotation	DomainEventMes SourceIdParameterRes
7	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.messaging.annotation	DomainEventMes AggregateTypeParameter
8	axon-messaging-4.9.3	org.axonframework.deadline	axon-messaging-4.9.3	org.axonframework.tracing	DeadlineMessage<-Sp
9	axon-messaging-4.9.3	org.axonframework.commandhandling	axon-messaging-4.9.3	org.axonframework.tracing	CommandMessage<-Sp
10	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore	EventStrean AbstractEventStorage
11	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore	EventStreamUtils<-DomainEvent
12	axon-messaging-4.9.3	org.axonframework.commandhandling.callbacks	axon-messaging-4.9.3	org.axonframework.commandhandling	NoOpCal SimpleCommandBus$
13	axon-messaging-4.9.3	org.axonframework.commandhandling.callbacks	axon-messaging-4.9.3	org.axonframework.commandhandling	LoggingCal SimpleCommandBus$
14	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.serialization	GapAwareTracking GapAwareTrackingTok
15	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.serialization	GenericEventMes AbstractXStreamS
16	axon-messaging-4.9.3	org.axonframework.eventhandling	axon-messaging-4.9.3	org.axonframework.serialization	GenericDomainEventMes AbstractXStrea
17	axon-messaging-4.9.3	org.axonframework.messaging.unitofwork	axon-messaging-4.9.3	org.axonframework.messaging	CurrentUnitOfWork<-GenericM
18	axon-messaging-4.9.3	org.axonframework.messaging.unitofwork	axon-messaging-4.9.3	org.axonframework.messaging	UnitOf MessageHandlerInte
19	axon-messaging-4.9.3	org.axonframework.messaging.unitofwork	axon-messaging-4.9.3	org.axonframework.messaging	UnitOfWork<-DefaultIntercept
20	axon-messaging-4.9.3	org.axonframework.eventhandling.async	axon-messaging-4.9.3	org.axonframework.eventhandling	SequencingF SimpleEventHandler
21	axon-messaging-4.9.3	org.axonframework.eventhandling.async	axon-messaging-4.9.3	org.axonframework.eventhandling	SequencingF SimpleEventHandlerInvoke
22	axon-messaging-4.9.3	org.axonframework.eventhandling.async	axon-messaging-4.9.3	org.axonframework.eventhandling	SequentialPerAggregateF SimpleEvent
23	axon-messaging-4.9.3	org.axonframework.eventhandling.replay	axon-messaging-4.9.3	org.axonframework.eventhandling	ResetCc AnnotationEventHandler
24	axon-messaging-4.9.3	org.axonframework.eventhandling.replay	axon-messaging-4.9.3	org.axonframework.eventhandling	GenericResetCc AnnotationEventHandl
25	axon-messaging-4.9.3	org.axonframework.eventhandling.replay	axon-messaging-4.9.3	org.axonframework.eventhandling	ResetContext<-Reset

	artifactName	packageName	dependentArtifactName	dependentPackageName	depe
26	axon-messaging-4.9.3	org.axonframework.serialization.upcasting.event	axon-messaging-4.9.3	org.axonframework.eventhandling	IntermediateEventRepresen Ev
27	axon-messaging-4.9.3	org.axonframework.serialization.upcasting.event	axon-messaging-4.9.3	org.axonframework.eventhandling	InitialEventRepresentation<-Ev
28	axon-messaging-4.9.3	org.axonframework.serialization.upcasting.event	axon-messaging-4.9.3	org.axonframework.eventhandling	EventUpcaster<-Ev
29	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc CleanGapsStatemen
30	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc FetchTrackedEventsStatemen
31	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc JdbcEventStorageEngineStat
32	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc CreateTokenAtStatemen
33	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc CreateTailTokenStatemen
34	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc DeleteSnapshotsStatemen
35	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc ReadSnapshotDataStatemen
36	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc ReadEventDataWithoutGapsState
37	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc AppendSnapshotStatemen
38	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc AppendEventsStatemen
39	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	axon-eventsourcing-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	EventSc ReadEventDataWithGapsStateme

Interface Segregation Candidates

Well known from Design Principles and Design Patterns by Robert C. Martin, the *Interface Segregation Principle* suggests that software components should have narrow, focused interfaces rather than large, general-purpose ones. The goal is to minimize the dependencies between components and increase modularity, flexibility, and maintainability.

Smaller, focused and purpose-driven interfaces

- make it easier to modify individual components without affecting the rest of the system.
- make it clearer which client is affected by which change.
- don't force their clients to depend on methods they don't need.
- reduce the scope of changes since a change to one component doesn't affect others.
- lead to a more loosely coupled architecture that is easier to understand and maintain.

Reference: Analyze java package metrics in a graph database

How to apply the results

If just one method of a type is used, especially in many places, then the result of this method can be used to call e.g. a method or constuct an object instead of using the whole object and then just calling that single method.

If there are a couple of methods that are used for a distinct purpose, those could be factored out into a separate interface. The original type can extended/implement the new interface so that there are no breaking changes. Then all the callers, that use only this group of methods, can be changed to the new interface.

Table 4 - Top 40 most used combinations of methods

The following table shows the top 40 most used combinations of methods of larger types that might benefit from applying the *Interface Segregation Principle*. The whole table can be found in the CSV report `Candidates_for_Interface_Segregation`.

	fullDependentTypeName	declaredMethods	calledMethodNames	calledMethods	callerTypes
0	org.axonframework.commandhandling.CommandMessage	9	[getCommandName]	1	18
1	org.axonframework.eventhandling.EventMessage	9	[getIdentifier, getTimestamp]	2	10
2	org.axonframework.eventhandling.DomainEventMes...	10	[getSequenceNumber]	1	9
3	org.axonframework.eventhandling.TrackedEventMe...	10	[trackingToken]	1	8
4	org.axonframework.eventhandling.DomainEventMes...	10	[getType, getSequenceNumber, getAggregateIdent...	3	7
5	org.axonframework.eventhandling.EventMessage	9	[getIdentifier]	1	7
6	org.axonframework.messaging.ResultMessage	9	[exceptionResult, isExceptional]	2	6
7	org.axonframework.commandhandling.GenericComma...	14	[asCommandResultMessage]	1	5
8	org.axonframework.deadline.GenericDeadlineMessage	11	[asDeadlineMessage]	1	5
9	org.axonframework.eventhandling.ReplayToken	13	[createReplayToken]	1	4
10	org.axonframework.modelling.command.inspection...	13	[type]	1	4
11	org.axonframework.eventhandling.TrackedEventMe...	12	[trackingToken]	1	4
12	org.axonframework.deadline.DeadlineMessage	10	[getDeadlineName]	1	4
13	org.axonframework.eventhandling.DomainEventMes...	10	[getAggregateIdentifier]	1	4
14	org.axonframework.eventhandling.DomainEventMes...	10	[getType]	1	4
15	org.axonframework.eventhandling.GenericEventMe...	10	[asEventMessage]	1	4
16	org.axonframework.eventhandling.EventMessage	9	[getTimestamp]	1	4
17	org.axonframework.deadline.DefaultDeadlineMana...	8	[builder]	1	4
18	org.axonframework.common.transaction.NoTransac...	4	[instance]	1	4
19	org.axonframework.commandhandling.GenericComma...	15	[asCommandResultMessage]	1	3
20	org.axonframework.eventhandling.DomainEventMes...	11	[getType, getSequenceNumber, getAggregateIdent...	3	3
21	org.axonframework.eventhandling.GenericEventMe...	11	[asEventMessage]	1	3
22	org.axonframework.eventhandling.TrackedEventMe...	11	[trackingToken]	1	3
23	org.axonframework.eventhandling.TrackedEventMe...	11	[withTrackingToken, trackingToken]	2	3
24	org.axonframework.eventhandling.DomainEventMes...	10	[getSequenceNumber, getAggregateIdentifier]	2	3
25	org.axonframework.eventhandling.GapAwareTracki...	10	[getIndex, withGapsTruncatedAt, getGaps, advan...	5	3
26	org.axonframework.eventhandling.TrackedEventData	5	[trackingToken]	1	3
27	org.axonframework.eventhandling.tokenstore.Con...	5	[get]	1	3
28	org.axonframework.eventhandling.TrackerStatus	17	[getSegment, split, getTrackingToken]	3	2
29	org.axonframework.modelling.command.inspection...	17	[initSequence, initialize, getAggregateRoot]	4	2
30	org.axonframework.queryhandling.SimpleQueryUpd...	17	[builder]	1	2
31	org.axonframework.commandhandling.CommandMessa...	14	[isFactoryHandler, commandName]	2	2
32	org.axonframework.commandhandling.GenericComma...	14	[asCommandResultMessage]	2	2
33	org.axonframework.deadline.DeadlineMessage	14	[getDeadlineName]	1	2
34	org.axonframework.messaging.GenericResultMessage	14	[asResultMessage]	1	2
35	org.axonframework.messaging.annotation.Wrapped...	14	[handle]	1	2
36	org.axonframework.eventhandling.DomainEventMes...	13	[getSequenceNumber, getAggregateIdentifier]	2	2
37	org.axonframework.eventhandling.ReplayToken	13	[isReplay]	1	2
38	org.axonframework.modelling.command.inspection...	13	[types]	1	2
39	org.axonframework.queryhandling.SubscriptionQu...	12	[getUpdateResponseType]	1	2

Package Usage

Table 5 - Types that are used by multiple packages

This table shows the top 40 packages that are used by the highest number of different packages. The whole table can be found in the CSV report `List_types_that_are_used_by_many_different_packages`.

	fullQualifiedDependentTypeName	dependentTypeName	dependentTypeLabels	numberOfUsingPackages
0	org.axonframework.common.BuilderUtils	BuilderUtils	[Type, File, Java, ByteCode, Class, TopCentral...	44
1	org.axonframework.common.AxonConfigurationExce...	AxonConfigurationException	[Type, File, Java, ByteCode, Class, TopCentral...	37
2	org.axonframework.messaging.Message	Message	[Type, File, Java, ByteCode, GenericDeclaratio...	34
3	org.axonframework.messaging.MetaData	MetaData	[Type, File, Java, ByteCode, Class, TopCentral...	33
4	org.axonframework.eventhandling.EventMessage	EventMessage	[Type, File, Java, ByteCode, GenericDeclaratio...	32
5	org.axonframework.messaging.unitofwork.UnitOfWork	UnitOfWork	[Type, File, Java, ByteCode, GenericDeclaratio...	31
6	org.axonframework.serialization.Serializer	Serializer	[Type, File, Java, ByteCode, Interface, TopCen...	29
7	org.axonframework.common.Assert	Assert	[Type, File, Java, ByteCode, Class, TopCentral...	27
8	org.axonframework.common.transaction.Transacti...	TransactionManager	[Type, File, Java, ByteCode, Interface, TopCen...	27
9	org.axonframework.serialization.SerializedObject	SerializedObject	[Type, File, Java, ByteCode, GenericDeclaratio...	25
10	org.axonframework.serialization.SerializedType	SerializedType	[Type, File, Java, ByteCode, Interface, TopCen...	24
11	org.axonframework.messaging.unitofwork.Current...	CurrentUnitOfWork	[Type, File, Java, ByteCode, Class, TopCentral...	21
12	org.axonframework.common.AxonNonTransientExcep...	AxonNonTransientException	[Type, File, Java, ByteCode, Class, TopCentral...	18
13	org.axonframework.eventhandling.DomainEventMes...	DomainEventMessage	[Type, File, Java, ByteCode, GenericDeclaratio...	18
14	org.axonframework.eventhandling.GenericEventMe...	GenericEventMessage	[Type, File, Java, ByteCode, Class, GenericDec...	18
15	org.axonframework.messaging.annotation.Paramet...	ParameterResolverFactory	[Type, File, Java, ByteCode, Interface, TopCen...	18
16	org.axonframework.eventhandling.TrackingToken	TrackingToken	[Type, File, Java, ByteCode, Interface, TopCen...	18
17	org.axonframework.common.Registration	Registration	[Type, File, Java, ByteCode, Interface, TypeWe...	17
18	org.axonframework.serialization.SimpleSerializ...	SimpleSerializedObject	[Type, File, Java, ByteCode, Class, GenericDec...	17
19	org.axonframework.messaging.MessageHandlerInte...	MessageHandlerInterceptor	[Type, File, Java, ByteCode, GenericDeclaratio...	16
20	org.axonframework.common.ObjectUtils	ObjectUtils	[Type, File, Java, ByteCode, Class, TypeWeakly...	16
21	org.axonframework.tracing.SpanFactory	SpanFactory	[Type, File, Java, ByteCode, Interface, TopCen...	16
22	org.axonframework.messaging.MessageDispatchInt...	MessageDispatchInterceptor	[Type, File, Java, ByteCode, GenericDeclaratio...	15
23	org.axonframework.commandhandling.CommandMessage	CommandMessage	[Type, File, Java, ByteCode, GenericDeclaratio...	14
24	org.axonframework.messaging.unitofwork.Default...	DefaultUnitOfWork	[Type, File, Java, ByteCode, Class, GenericDec...	14
25	org.axonframework.messaging.annotation.Handler...	HandlerDefinition	[Type, File, Java, ByteCode, Interface, TopCen...	14
26	org.axonframework.common.ReflectionUtils	ReflectionUtils	[Type, File, Java, ByteCode, Class, TypeWeakly...	14
27	org.axonframework.eventhandling.EventBus	EventBus	[Type, File, Java, ByteCode, Interface, TopCen...	13
28	org.axonframework.lifecycle.Lifecycle	Lifecycle	[Type, File, Java, ByteCode, Interface, TypeWe...	13
29	org.axonframework.lifecycle.Lifecycle$Lifecycl...	Lifecycle$LifecycleRegistry	[Type, File, Java, ByteCode, Interface, TypeWe...	13
30	org.axonframework.common.transaction.NoTransac...	NoTransactionManager	[Type, File, Java, ByteCode, Enum, TypeWeaklyC...	13
31	org.axonframework.messaging.ResultMessage	ResultMessage	[Type, File, Java, ByteCode, GenericDeclaratio...	13
32	org.axonframework.common.DateTimeUtils	DateTimeUtils	[Type, File, Java, ByteCode, Class, TypeWeakly...	12
33	org.axonframework.messaging.DefaultInterceptor...	DefaultInterceptorChain	[Type, File, Java, ByteCode, Class, GenericDec...	12
34	org.axonframework.messaging.InterceptorChain	InterceptorChain	[Type, File, Java, ByteCode, Interface, TypeWe...	12

	fullQualifiedDependentTypeName	dependentTypeName	dependentTypeLabels	numberOfUsingPackages
35	org.axonframework.tracing.NoOpSpanFactory	NoOpSpanFactory	[Type, File, Java, ByteCode, Class, TypeWeakly...	12
36	org.axonframework.messaging.ScopeDescriptor	ScopeDescriptor	[Type, File, Java, ByteCode, Interface, TypeWe...	12
37	org.axonframework.common.AxonTransientException	AxonTransientException	[Type, File, Java, ByteCode, Class, TypeWeakly...	11
38	org.axonframework.messaging.annotation.Classpa...	ClasspathHandlerDefinition	[Type, File, Java, ByteCode, Class, TypeWeakly...	11
39	org.axonframework.messaging.annotation.Classpa...	ClasspathParameterResolverFactory	[Type, File, Java, ByteCode, Class, TypeWeakly...	11

Table 6 - Packages that are used by multiple artifacts

This table shows the top 30 artifacts that only use a few (compared to all existing) packages of another artifact. The whole table can be found in the CSV report `ArtifactPackageUsage` .

	artifactName	dependentArtifactName	dependentPackages	dependentArtifactPackages	packageUsagePercentage	dependentFullQualifiedPackageNames	depende
0	axon-modelling-4.9.3	axon-modelling-4.9.3	6	10	0.600000	[org.axonframework.modelling.command, org.axon...	[cor reposi
1	axon-test-4.9.3	axon-test-4.9.3	5	8	0.625000	[org.axonframework.test, org.axonframework.tes...	[t matche
2	axon-messaging-4.9.3	axon-messaging-4.9.3	41	64	0.640625	[org.axonframework.messaging, org.axonframewor...	[mes deadl
3	axon-eventsourcing-4.9.3	axon-eventsourcing-4.9.3	7	9	0.777778	[org.axonframework.eventsourcing, org.axonfram...	snapsl

Table 7 - Types that are used by multiple artifacts

This table shows the top 30 types that only use a few (compared to all existing) types of another artifact. The whole table can be found in the CSV report `ClassesPerPackageUsageAcrossArtifacts` .

	artifactName	dependentArtifactName	packageName	dependentPackage.fqn	dependentTypes	dependentPackageT
0	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.snapshotting	org.axonframework.eventhandling	1	
1	axon-modelling-4.9.3	axon-messaging-4.9.3	org.axonframework.modelling.saga.metamodel	org.axonframework.eventhandling	1	
2	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.matchers	org.axonframework.eventhandling	1	
3	axon-eventsourcing-4.9.3	axon-modelling-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	org.axonframework.modelling.command	1	
4	axon-eventsourcing-4.9.3	axon-modelling-4.9.3	org.axonframework.eventsourcing.conflictresolu...	org.axonframework.modelling.command	1	
5	axon-modelling-4.9.3	axon-messaging-4.9.3	org.axonframework.modelling.command.legacyjpa	org.axonframework.eventhandling	2	
6	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.conflictresolu...	org.axonframework.eventhandling	2	
7	axon-modelling-4.9.3	axon-messaging-4.9.3	org.axonframework.modelling.command	org.axonframework.eventhandling	2	
8	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.eventscheduler	org.axonframework.eventhandling	2	
9	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.eventstore	org.axonframework.messaging	1	
10	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.conflictresolu...	org.axonframework.messaging	1	
11	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test	org.axonframework.messaging	1	
12	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.matchers	org.axonframework.messaging	1	
13	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.eventstore.jpa	org.axonframework.serialization	1	
14	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.eventstore.jdbc	org.axonframework.serialization	1	
15	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.eventstore.leg...	org.axonframework.serialization	1	
16	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	org.axonframework.eventhandling	3	
17	axon-test-4.9.3	axon-modelling-4.9.3	org.axonframework.test.utils	org.axonframework.modelling.saga	1	
18	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.conflictresolu...	org.axonframework.commandhandling	1	
19	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.matchers	org.axonframework.commandhandling	1	
20	axon-modelling-4.9.3	axon-messaging-4.9.3	org.axonframework.modelling.command.legacyjpa	org.axonframework.common	1	
21	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.eventstore.jdb...	org.axonframework.common	1	
22	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.server	org.axonframework.common	1	
23	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.eventscheduler	org.axonframework.common	1	
24	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test.utils	org.axonframework.common	1	
25	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.conflictresolu...	org.axonframework.common	1	
26	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.snapshotting	org.axonframework.common	1	
27	axon-test-4.9.3	axon-messaging-4.9.3	org.axonframework.test	org.axonframework.messaging.annotation	2	
28	axon-eventsourcing-4.9.3	axon-messaging-4.9.3	org.axonframework.eventsourcing.conflictresolu...	org.axonframework.messaging.annotation	2	

	artifactName	dependentArtifactName	packageName	dependentPackage.fqn	dependentTypes	dependentPackageT
29	axon-modelling-4.9.3	axon-messaging-4.9.3	org.axonframework.modelling.command.legacyjpa	org.axonframework.messaging.annotation	2	

Table 8 - Duplicate package names across artifacts

This table shows the top 30 duplicate package names across artifacts. They are ordered by the number of duplicates descending.

This might lead to confusion, makes importing more error prone and might even lead to duplicate classes where only one of them will be loaded by the class loader. If a package is named the same way in two or more artifacts this even allows another artifact to access package protected classes, methods or members which might not be intended.

The whole table can be found in the CSV report `DuplicatePackageNamesAcrossArtifacts` .

packageName	duplicates	artifactNames

Table 9 - Annotated elements

This table shows 30 most used Java Annotations including some examples where they are used.

	annotationName	languageElement	numberOfAnnotatedElements	examples
0	javax.annotation.Nonnull	Parameter	1501	[org.axonframework.eventsourcing.AbstractSnaps...
1	java.lang.Deprecated	Method	96	[org.axonframework.eventsourcing.AbstractSnaps...
2	javax.annotation.Nullable	Parameter	61	[org.axonframework.eventsourcing.eventstore.Ev...
3	java.lang.FunctionalInterface	Interface	54	[org.axonframework.eventsourcing.conflictresol...
4	java.lang.annotation.Retention	Annotation	40	[org.axonframework.eventsourcing.EventSourcing...
5	java.lang.annotation.Target	Annotation	40	[org.axonframework.eventsourcing.EventSourcing...
6	javax.persistence.Basic	Field	39	[org.axonframework.eventhandling.AbstractDomai...
7	javax.annotation.Nonnull	Method	37	[org.axonframework.commandhandling.gateway.Def...
8	jakarta.persistence.Basic	Field	33	[org.axonframework.eventhandling.AbstractDomai...
9	com.fasterxml.jackson.annotation.JsonProperty	Parameter	32	[org.axonframework.commandhandling.distributed...
10	java.lang.Deprecated	Class	25	[org.axonframework.eventsourcing.MultiStreamab...
11	java.beans.ConstructorProperties	Constructor	21	[org.axonframework.commandhandling.distributed...
12	java.lang.annotation.Documented	Annotation	21	[org.axonframework.eventsourcing.EventSourcing...
13	java.lang.Deprecated	Constructor	17	[org.axonframework.eventsourcing.MultiStreamab...
14	com.fasterxml.jackson.annotation.JsonCreator	Constructor	16	[org.axonframework.eventhandling.GapAwareTrack...
15	javax.persistence.Column	Field	12	[org.axonframework.eventhandling.AbstractEvent...
16	org.axonframework.common.Priority	Class	11	[org.axonframework.config.ConfigurationParamet...
17	jakarta.persistence.Column	Field	11	[org.axonframework.eventhandling.AbstractEvent...
18	javax.persistence.Lob	Field	10	[org.axonframework.eventhandling.AbstractEvent...
19	javax.persistence.Id	Field	10	[org.axonframework.eventsourcing.eventstore.Ab...
20	com.fasterxml.jackson.annotation.JsonGetter	Method	9	[org.axonframework.commandhandling.distributed...
21	java.lang.SafeVarargs	Constructor	9	[org.axonframework.commandhandling.gateway.Non...
22	jakarta.persistence.Id	Field	9	[org.axonframework.eventsourcing.eventstore.Ab...
23	jakarta.persistence.Lob	Field	8	[org.axonframework.eventhandling.AbstractEvent...
24	org.axonframework.messaging.annotation.HasHand...	Annotation	8	[org.axonframework.eventhandling.AllowReplay, ...
25	javax.persistence.MappedSuperclass	Class	6	[org.axonframework.eventsourcing.eventstore.Ab...
26	org.axonframework.messaging.annotation.Message...	Annotation	6	[org.axonframework.commandhandling.CommandHand...
27	java.lang.SafeVarargs	Method	6	[org.axonframework.config.AggregateConfigurer....
28	jakarta.persistence.Entity	Class	6	[org.axonframework.eventsourcing.eventstore.jp...
29	javax.persistence.Entity	Class	6	[org.axonframework.eventsourcing.eventstore.jp...