Visibility Metrics

References

- Visibility Metrics and the Importance of Hiding Things
- Calculate metrics
- Controlling Access to Members of a Class
- Neo4j Python Driver

Relative Visibility Of Types

A Java class or interface may be declared with the modifier public, in which case it is visible to all classes everywhere. If a class or interface has no modifier (the default, also known as package-private), it is visible only within its own package.

The relative visibility is the number of inner components that are visible outside (public) divided by the number of all types:

$$relativevisibility = \frac{public\ types}{all\ types}$$

Using package protected types is one of many ways to improve encapsulation and implementation detail hiding.

How to apply the results

The relative visibility is between zero (all types are package protected) and one (all types are public). A value lower than one means that there are types that are declared package protected. The lower the value is, the better implementation details are hidden.

Non public classes can't be accessed from another package so they can be changed without affecting code in other packages. They clearly indicate functionality that only belongs to one package. This also motivates to use more classes and to split up code into smaller pieces with a single responsibility and reason to change.

Table 1a - Top 40 artifacts with lowest median of package protection

encapsulation

This table shows the relative visibility statistics aggregated for all packages per artifact and focusses on artifacts with many packages and hardly any package protected types (lowest median, high visibility). Package protected types would help to improve encapsulation.

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

	artifact	all	public	min	max	average	percentile25	percentile50	percentile75	percentile90
0	axon-messaging-4.9.2	786	644	0.095238	1.000000	0.866504	0.750000	0.973684	1.000000	1.000000
1	axon-modelling-4.9.2	156	135	0.500000	1.000000	0.806526	0.737500	0.813187	0.897222	1.000000
2	axon-eventsourcing-4.9.2	133	98	0.500000	1.000000	0.771804	0.612903	0.785714	1.000000	1.000000
3	axon-test-4.9.2	87	65	0.473684	1.000000	0.781086	0.650000	0.775000	0.968750	1.000000
4	axon-configuration-4.9.2	40	27	0.675000	0.675000	0.675000	0.675000	0.675000	0.675000	0.675000
5	axon-disruptor-4.9.2	22	9	0.409091	0.409091	0.409091	0.409091	0.409091	0.409091	0.409091

Table 1b - Top 40 artifacts with highest median of package protection encapsulation

This table shows the relative visibility statistics aggregated for all packages per artifact and focusses on artifacts with many packages and the highest median of package protected types (low visibility). Package protected types help to improve encapsulation.

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

	artifact	all	public	min	max	average	percentile25	percentile50	percentile75	percentile90
0	axon-disruptor-4.9.2	22	9	0.409091	0.409091	0.409091	0.409091	0.409091	0.409091	0.409091
1	axon-configuration-4.9.2	40	27	0.675000	0.675000	0.675000	0.675000	0.675000	0.675000	0.675000
2	axon-test-4.9.2	87	65	0.473684	1.000000	0.781086	0.650000	0.775000	0.968750	1.000000
3	axon-eventsourcing-4.9.2	133	98	0.500000	1.000000	0.771804	0.612903	0.785714	1.000000	1.000000
4	axon-modelling-4.9.2	156	135	0.500000	1.000000	0.806526	0.737500	0.813187	0.897222	1.000000
5	axon-messaging-4.9.2	786	644	0.095238	1.000000	0.866504	0.750000	0.973684	1.000000	1.000000

Table 1 Chart 1 - Relative visibility in artifacts

```
/home/runner/miniconda3/envs/codegraph/lib/python3.11/site-packages/pandas/plotting/_
matplotlib/core.py:1259: UserWarning: No data for colormapping provided via 'c'. Para
meters 'cmap' will be ignored
  scatter = ax.scatter(
<Figure size 640x480 with 0 Axes>
```

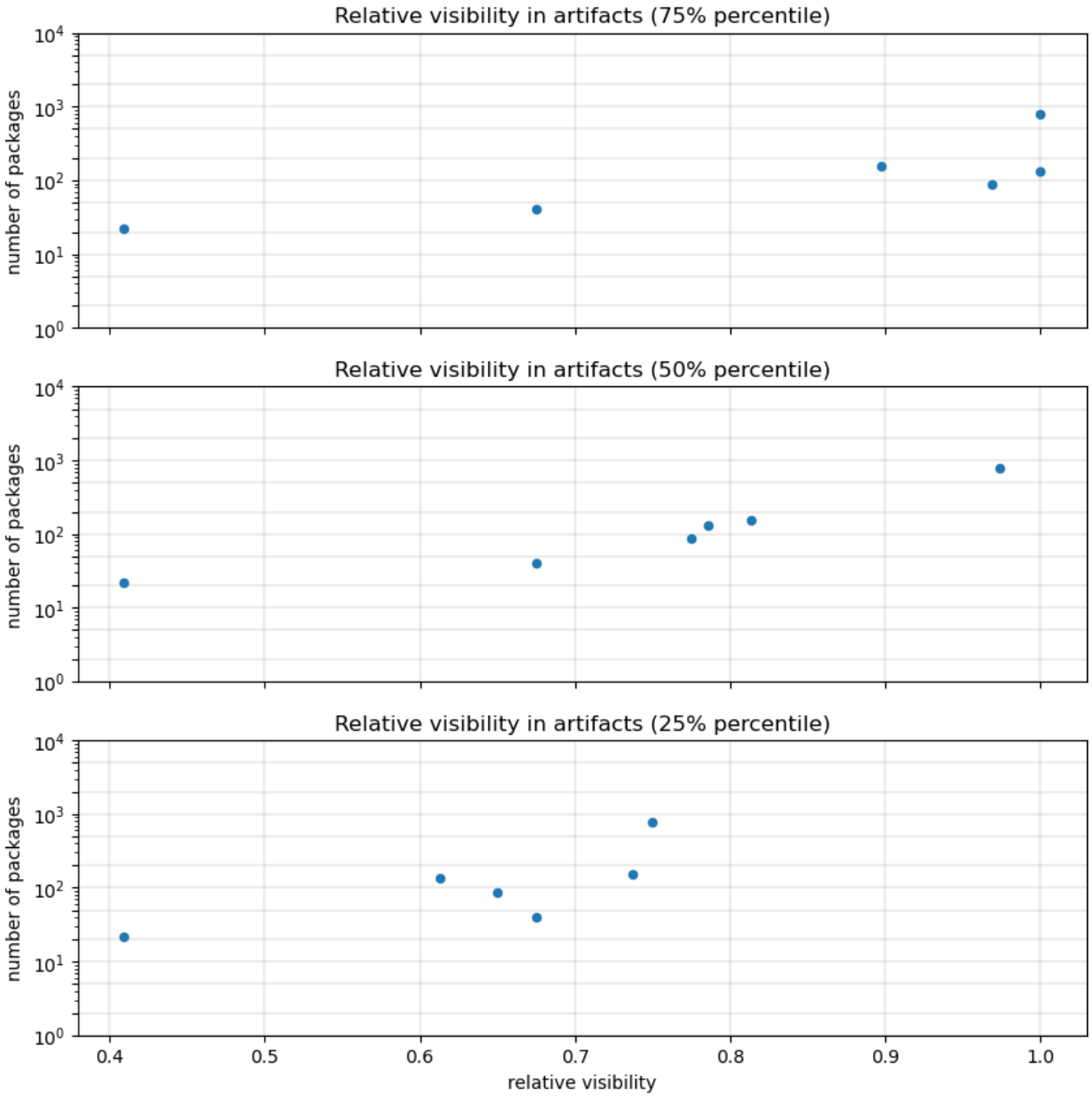


Table 2a - Top 40 packages with the highest visibility and lowest encapsulation

This table shows the relative visibility statistics per packages and artifact and focusses on packages with many types, hardly any package protected ones and therefore the highest relative visibility (lowest encapsulation). Package protected types would help to improve encapsulation.

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

	artifactName	fullQualifiedPackageName	packageName	publicTypes	allTypes	relativeVisibility
0	axon-modelling-4.9.2	org.axonframework.modelling.saga	saga	33	33	1.000000
1	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.eventstore.jdb...	statements	15	15	1.000000
2	axon-messaging-4.9.2	org.axonframework.serialization.upcasting.event	event	12	12	1.000000
3	axon-messaging-4.9.2	org.axonframework.lifecycle	lifecycle	10	10	1.000000
4	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.conflictresolu...	conflictresolution	9	9	1.000000
5	axon-messaging-4.9.2	org.axonframework.common.property	property	9	9	1.000000
6	axon-messaging-4.9.2	org.axonframework.messaging.interceptors	interceptors	8	8	1.000000
7	axon-messaging-4.9.2	org.axonframework.messaging.responsetypes	responsetypes	8	8	1.000000
8	axon-messaging-4.9.2	org.axonframework.commandhandling.distributed....	commandfilter	7	7	1.000000
9	axon-messaging-4.9.2	org.axonframework.deadline.dbscheduler	dbscheduler	7	7	1.000000
10	axon-messaging-4.9.2	org.axonframework.eventhandling.scheduling.dbs...	dbscheduler	7	7	1.000000
11	axon-messaging-4.9.2	org.axonframework.serialization.json	json	7	7	1.000000
12	axon-messaging-4.9.2	org.axonframework.eventhandling.tokenstore	tokenstore	7	7	1.000000
13	axon-messaging-4.9.2	org.axonframework.serialization.xml	xml	7	7	1.000000
14	axon-messaging-4.9.2	org.axonframework.tracing.attributes	attributes	6	6	1.000000
15	axon-messaging-4.9.2	org.axonframework.eventhandling.scheduling.quartz	quartz	6	6	1.000000
16	axon-messaging-4.9.2	org.axonframework.serialization.upcasting	upcasting	6	6	1.000000
17	axon-messaging-4.9.2	org.axonframework.serialization.converters	converters	5	5	1.000000
18	axon-messaging-4.9.2	org.axonframework.eventhandling.gateway	gateway	5	5	1.000000
19	axon-messaging-4.9.2	org.axonframework.queryhandling.registration	registration	5	5	1.000000
20	axon-test-4.9.2	org.axonframework.test.eventscheduler	eventscheduler	5	5	1.000000
21	axon-messaging-4.9.2	org.axonframework.commandhandling.callbacks	callbacks	4	4	1.000000
22	axon-messaging-4.9.2	org.axonframework.messaging.correlation	correlation	4	4	1.000000
23	axon-messaging-4.9.2	org.axonframework.deadline.jobrunr	jobrunr	4	4	1.000000
24	axon-messaging-4.9.2	org.axonframework.common.jpa	jpa	4	4	1.000000
25	axon-messaging-4.9.2	org.axonframework.eventhandling.tokenstore.jpa	jpa	4	4	1.000000
26	axon-messaging-4.9.2	org.axonframework.common.legacyjpa	legacyjpa	4	4	1.000000
27	axon-messaging-4.9.2	org.axonframework.deadline.quartz	quartz	4	4	1.000000
28	axon-test-4.9.2	org.axonframework.test.deadline	deadline	4	4	1.000000
29	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.snapshotting	snapshotting	3	3	1.000000
30	axon-messaging-4.9.2	org.axonframework.eventhandling.scheduling.job...	jobrunr	3	3	1.000000
31	axon-messaging-4.9.2	org.axonframework.eventhandling.scheduling	scheduling	3	3	1.000000
32	axon-messaging-4.9.2	org.axonframework.util	util	3	3	1.000000
33	axon-messaging-4.9.2	org.axonframework.eventhandling.tokenstore.leg...	legacyjpa	2	2	1.000000
34	axon-messaging-4.9.2	org.axonframework.messaging.interceptors.legac...	legacyvalidation	2	2	1.000000
35	axon-modelling-4.9.2	org.axonframework.modelling.command.legacyjpa	legacyjpa	2	2	1.000000
36	axon-messaging-4.9.2	org.axonframework.common.digest	digest	1	1	1.000000
37	axon-messaging-4.9.2	org.axonframework.eventhandling.interceptors	interceptors	1	1	1.000000
38	axon-messaging-4.9.2	org.axonframework.common.io	io	1	1	1.000000
39	axon-test-4.9.2	org.axonframework.test.matchers	matchers	23	24	0.958333

Table 2b - Top 40 packages with the lowest visibility and highest encapsulation

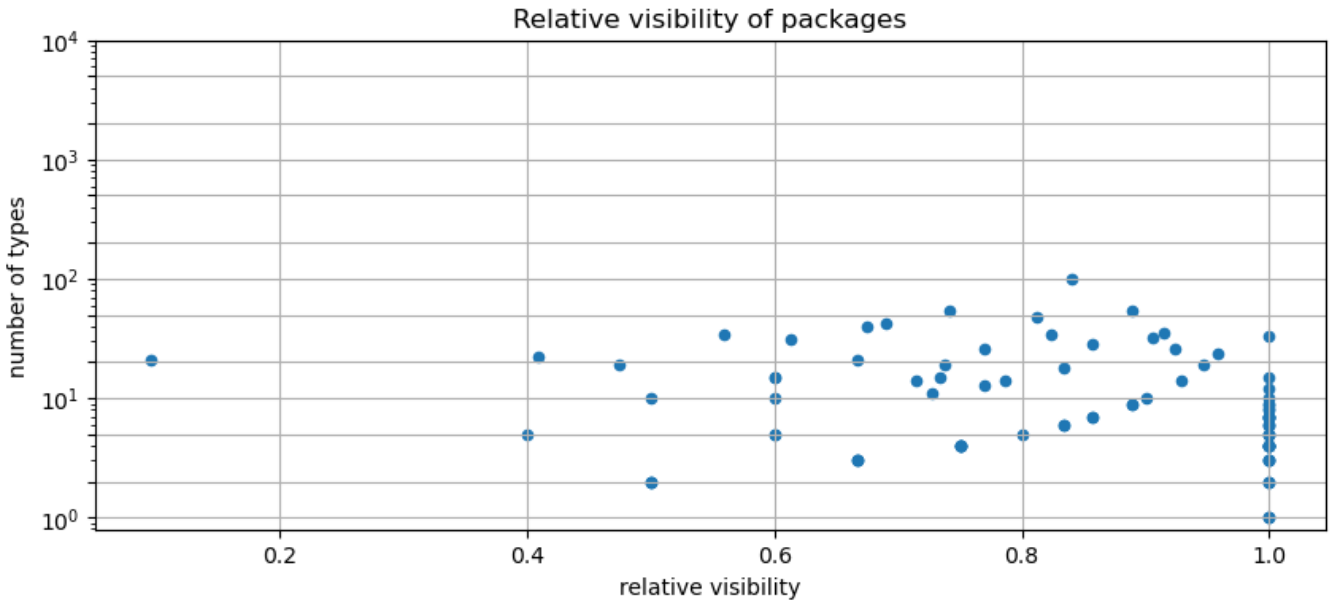
This table shows the relative visibility statistics per packages and artifact and focusses on packages with many types, many package protected ones and therefore the lowest relative visibility (highest encapsulation). Package protected types help to improve encapsulation. Zero percent visibility and therefore packages with no public visible type are suspicious to be dead code.

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

	artifactName	fullQualifiedPackageName	packageName	publicTypes	allTypes	relativeVisibility
0	axon-messaging-4.9.2	org.axonframework.eventhandling.pooled	pooled	2	21	0.095238
1	axon-messaging-4.9.2	org.axonframework.eventhandling.deadletter	deadletter	2	5	0.400000
2	axon-disruptor-4.9.2	org.axonframework.disruptor.commandhandling	commandhandling	9	22	0.409091
3	axon-test-4.9.2	org.axonframework.test.aggregate	aggregate	9	19	0.473684
4	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.eventstore.leg...	legacyjpa	5	10	0.500000
5	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.eventstore.inm...	inmemory	1	2	0.500000
6	axon-messaging-4.9.2	org.axonframework.eventhandling.tokenstore.inm...	inmemory	1	2	0.500000
7	axon-modelling-4.9.2	org.axonframework.modelling.saga.repository.in...	inmemory	1	2	0.500000
8	axon-messaging-4.9.2	org.axonframework.commandhandling.gateway	gateway	19	34	0.558824
9	axon-messaging-4.9.2	org.axonframework.eventhandling.async	async	9	15	0.600000
10	axon-messaging-4.9.2	org.axonframework.common.caching	caching	9	15	0.600000
11	axon-messaging-4.9.2	org.axonframework.eventhandling.replay	replay	6	10	0.600000
12	axon-messaging-4.9.2	org.axonframework.deadline.annotation	annotation	3	5	0.600000
13	axon-test-4.9.2	org.axonframework.test	test	3	5	0.600000
14	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.eventstore	eventstore	19	31	0.612903
15	axon-test-4.9.2	org.axonframework.test.saga	saga	14	21	0.666667
16	axon-messaging-4.9.2	org.axonframework.common.annotation	annotation	2	3	0.666667
17	axon-messaging-4.9.2	org.axonframework.common.stream	stream	2	3	0.666667
18	axon-modelling-4.9.2	org.axonframework.modelling.saga.repository.le...	legacyjpa	2	3	0.666667
19	axon-configuration-4.9.2	org.axonframework.config	config	27	40	0.675000
20	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing	eventsourcing	29	42	0.690476
21	axon-messaging-4.9.2	org.axonframework.messaging.unitofwork	unitofwork	10	14	0.714286
22	axon-messaging-4.9.2	org.axonframework.common.lock	lock	8	11	0.727273
23	axon-modelling-4.9.2	org.axonframework.modelling.saga.repository	repository	11	15	0.733333
24	axon-messaging-4.9.2	org.axonframework.tracing	tracing	14	19	0.736842
25	axon-messaging-4.9.2	org.axonframework.messaging.annotation	annotation	40	54	0.740741
26	axon-messaging-4.9.2	org.axonframework.queryhandling.annotation	annotation	3	4	0.750000
27	axon-messaging-4.9.2	org.axonframework.eventhandling.scheduling.java	java	3	4	0.750000
28	axon-messaging-4.9.2	org.axonframework.common.transaction	transaction	3	4	0.750000
29	axon-modelling-4.9.2	org.axonframework.modelling.saga.metamodel	metamodel	3	4	0.750000
30	axon-test-4.9.2	org.axonframework.test.server	server	3	4	0.750000
31	axon-modelling-4.9.2	org.axonframework.modelling.command.inspection	inspection	20	26	0.769231
32	axon-messaging-4.9.2	org.axonframework.deadline	deadline	10	13	0.769231
33	axon-eventsourcing-4.9.2	org.axonframework.eventsourcing.eventstore.jdbc	jdbc	11	14	0.785714
34	axon-test-4.9.2	org.axonframework.test.utils	utils	4	5	0.800000
35	axon-messaging-4.9.2	org.axonframework.queryhandling	queryhandling	39	48	0.812500
36	axon-messaging-4.9.2	org.axonframework.serialization	serialization	28	34	0.823529
37	axon-messaging-4.9.2	org.axonframework.common.jdbc	jdbc	15	18	0.833333
38	axon-messaging-4.9.2	org.axonframework.eventhandling.deadletter.leg...	legacyjpa	5	6	0.833333
39	axon-messaging-4.9.2	org.axonframework.monitoring	monitoring	5	6	0.833333

Table 2 Chart 1 - Relative visibility of packages

```
/home/runner/miniconda3/envs/codegraph/lib/python3.11/site-packages/pandas/plotting/_
matplotlib/core.py:1259: UserWarning: No data for colormapping provided via 'c'. Para
meters 'cmap' will be ignored
  scatter = ax.scatter(
<Figure size 640x480 with 0 Axes>
```


Relative visibility of packages
number of types
relative visibility
10^0
10^1
10^2
10^3
10^4
0.2
0.4
0.6
0.8
1.0