Original	First Map	Category	Used by	Examples	Frequencies in %	Semantics in ITS
Backports	Backport	Workflow	MongoDB	TOOLS-1905, TOOLS-1968, COMPASS-4301, DOCS-13026	0.2% [66]	This issue backports / backported by Issue A
Blocked	Block	Temporal/Causal	Apache	ZOOKEEPER-3534, YUNIKORN-208, ZEPPELIN-889	0.4%	This issue Blocked Issue A
Blocker	Block	Temporal/Causal	Apache, IntelDAOS, Jira, JiraEcosystem	ZOOKEEPER-2342, ZEPPELIN-4452| DAOS-3760, DAOS-273, DAOS-256 | SRCTREEWIN-13457 | AC-1027	5.7%, 6.5%, 1.0%, 5.8%	This issue blocks / is blocked by / is blocking Issue A
Blocks	Block	Temporal/Causal	Hyperledger, JiraEcosystem, MariaDB, Mindville, RedHat	URSA-5 | ACJIRA-1981 | MDEV-15935 | ICS-1891 | XNIO-376	8.3%, 0.0% [1], 13.0%, 2.3% [1], 15.3%	This issue blocks / is blocked by Issue A
Bonfire Testing	Bonfire Testing	Workflow	Jira, JiraEcosystem, Sonatype	SRCTREE-2104 | VCACHE-41 | OSSRH-66907	0.2% [216], 0.4%, 8.1%	This issue Discovered while testing / Testing discovered Issue A
Bonfire testing	Bonfire Testing	Workflow	JiraEcosystem	UPM-6051	0.5%	This issue Discovered while testing / Testing discovered Issue A
Git Code Review	Bonfire Testing	Workflow	Hyperledger, Sakai	FABN-1283 | SAK-31134	0.0% [7], 0.0% [1]	This issue opened during git code review in / git code review opened Issue A
Testing	Bonfire Testing	Workflow	Apache	HDDS-4181	0.0% [2]	This issue Testing discovered / Discovered while testing Issue A
Causality	Cause	Temporal/Causal	RedHat	XNIO-380, WINDUP-2292, JBEAP-10283	2.7%	This issue causes / caused by Issue A
Cause	Cause	Temporal/Causal	Jira, JiraEcosystem	SRCTREEWIN-13474 | AC-1258	1.8%, 3.7%	This issue causes / caused by Issue A
Caused	Cause	Temporal/Causal	Sonatype	NEXUS-5146, NEXUS-1335	5.2%	This issue causes / caused by Issue A
Problem/Incident	Cause	Temporal/Causal	Apache, MariaDB, MongoDB	ZOOKEEPER-3371 | CONJ-664, CONJ-706 | WT-7229	1.0%, 6.0%, 1.7%	This issue causes / caused by Issue A
Child-Issue	Parent-Child	Composition	Apache	ZEPPELIN-2368, HADOOP-16264	0.8%	This issue is a parent / child of Issue A
Parent Feature	Parent-Child	Composition	Apache	ZEPPELIN-1967, KAFKA-6687	0.0% [47]	This issue Parent Feature Issue A
Parent/Child	Parent-Child	Composition	SecondLife	STORM-1786, OPEN-105	6.5%	This issue is a parent / child of Issue A
multi-level hierarchy [GANTT]	Parent-Child	Composition	RedHat	RFE-1576	0.1% [57]	This issue is parent task / subtask of Issue A
Cloners	Clone	Duplication	Apache, Hyperledger, IntelDAOS, JFrog, Jira, JiraEcosystem, Mindville, MongoDB, RedHat, Sakai, SecondLife, Spring	ZOOKEEPER-4209, ZOOKEEPER-1104 | STL-759 | DAOS-7120 | RTFACT-22134 | SRCTREEWIN-13480 | WLC-42 | ICC-79 | WT-6338 | WINDUP-2581, JBEAP-20958 | YAFT-60 | STORM-698 | SPR-8443	1.7%, 2.9%, 4.5%, 0.6%, 2.8%, 1.8%, 15.9%, 0.2% [59], 14.4%, 4.8%, 7.6%, 0.1% [14]	This issue is a clone of / cloned by / cloned as / cloned from / cloned to / clones / orginal of duplicate / duplicates Issue A
Cloners (old)	Clone	Duplication	RedHat	XNIO-381, WFLY-13635	1.2%	This issue cloned to / cloned from Issue A
Collection	Incorporate	Composition	SecondLife	STORM-2067, STORM-1951	2.2%	This issue includes / is included in Issue A
Container	Incorporate	Composition	Apache	ZOOKEEPER-2139, YETUS-83	1.4%	This issue contains / is contained by Issue A
Contains(WBSGantt)	Incorporate	Composition	JFrog	RTFACT-14728, HAP-1357	1.3%	This issue contains / is contained in Issue A
Incorporate	Incorporate	Composition	Sakai	SAK-43977, SAK-43259	6.7%	This issue incorporates / incorporated by Issue A
Incorporates	Incorporate	Composition	Apache	ZOOKEEPER-3642, YARN-7055	2.7%	This issue incorporates / is part of Issue A
Part	Incorporate	Composition	Jira, JiraEcosystem	SRCTREEWIN-12484 | VOTE-56	2.5%, 1.8%	This issue incorporates / incorporated by Issue A
PartOf	Incorporate	Composition	MariaDB	CONJ-736	7.9%	This issue includes / is part of
Superset	Incorporate	Composition	RedHat	WFCORE-5171	9.1%	This issue incorporates / incorporated by Issue A
Completes	Fix	Workflow	Apache	ZOOKEEPER-3829, OFBIZ-12093	0.2% [533]	This issue fixes / fixed by Issue A
Fixes	Fix	Workflow	Sonatype	OSSRH-54803	2.4%	This issue fixes / fixed by Issue A
Resolve	Fix	Workflow	Jira	MIG-150	0.1% [54]	This issue resolves / resolved by Issue A
Depend	Depend	Temporal/Causal	Sakai, Spring	YAFT-63, XD-3743	12.9%, 8.7%	This issue is depended on by / depends on Issue A
Dependency	Depend	Temporal/Causal	Apache, JFrog, Qt	ZEPPELIN-3856 | TCAP-323 | QTVSADDINBUG-678	0.0% [99], 8.0%, 16.4%	This issue Dependency / depends on / is a precondition for / is required for Issue A
Dependent	Depend	Temporal/Causal	Apache	ZOOKEEPER-704	0.2% [368]	This issue Dependent Issue A
Depends	Depend	Temporal/Causal	Jira, JiraEcosystem, MongoDB, SecondLife, Spring	SRCTREEWIN-2098 | UPM-2955 | SERVER-54301 | STORM-685 | SWS-515	0.1% [51], 1.1%, 17.4%, 4.4%, 3.4%	This issue depends on / depended on by Issue A
Gantt Dependency	Depend	Temporal/Causal	MongoDB	WT-7164	1.1%	This issue has to be done before / after Issue A
dependent	Depend	Temporal/Causal	Apache, Sonatype	ZOOKEEPER-3561 | OSSRH-67203	5.0%, 3.7%	This issue depends upon / is depended upon by Issue A
Derived	Derive	Workflow	Jira	SRCTREEWIN-6499, JSWCLOUD-19707	0.5%	This issue derived from / has a derivative of Issue A
Detail	Detail	Workflow	Jira	JSWSERVER-8942	1.9%	This issue details / is detailed by Issue A
Documentation	Documented	Workflow	RedHat	WINDUP-2289	0.5%	This issue documents / is documented by Issue A
Documented	Documented	Workflow	MongoDB	DOCS-10562	4.5%	This issue documents / is documented by Issue A
Duplicate	Duplicate	Duplication	Apache, Hyperledger, IntelDAOS, JFrog, Jira, JiraEcosystem, MariaDB, Mindville, MongoDB, Qt, RedHat, Sakai, Sonatype, Spring	ZOOKEEPER-4256, IS-1289, DAOS-3455, TCAP-321, SRCTREEWIN-12912, UPM-3802, CONJ-751, IMFC-41, WT-7240, PYSIDE-1498, WINDUP-2496, SLIB-77, OSSRH-66926, XD-731	10.2%, 3.9%, 3.6%, 19.9%, 21.8%, 15.8%, 9.4%, 38.6%, 17.4%, 10.7%, 5.1%, 9.5%, 7.9%, 12.1%	This issue duplicates / duplicated by Issue A
Epic	Epic	Composition	JiraEcosystem	UPM-3616	0.2% [21]	This issue belongs to epic / is the epic for Issue A
Finish-to-Finish link (WBSGantt)	finish-finish	Temporal/Causal	JFrog	RTFACT-22296	0.0% [1]	This issue Linked one can't finish until this issue is done. / can't finish until the linked issue is done. Issue A
Gantt End to End	finish-finish	Temporal/Causal	IntelDAOS, JFrog, MongoDB	DAOS-5115 | RTFACT-21385 | WT-5940	0.4% [13], 0.1% [4], 0.0% [16]	This issue has to be finished together with Issue A
Gantt: finish-finish	finish-finish	Temporal/Causal	RedHat	WRKLDS-260	0.0% [18]	This issue has to be finished together with Issue A
finish-finish [GANTT]	finish-finish	Temporal/Causal	RedHat	THREESCALE-6611	0.0% [1]	This issue has to be finished together with Issue A
Gantt End to Start	finish-start	Temporal/Causal	IntelDAOS, JFrog	DAOS-4867, HAP-1445	1.1%, 0.1% [3]	This issue has to be done before / after Issue A
Gantt: finish-start	finish-start	Temporal/Causal	RedHat	WFLY-14567	0.0% [42]	This issue has to be done before / after Issue A
finish-start [GANTT]	finish-start	Temporal/Causal	RedHat	WFLY-14377	0.0% [9]	This issue has to be done before / after Issue A
Gantt Start to Start	start-start	Temporal/Causal	IntelDAOS, JFrog	DAOS-3295 | RTFACT-20326	0.0% [1], 0.0% [1]	This issue has to be started together with Issue A
Gantt: start-finish	start-finish	Temporal/Causal	RedHat	RHPAM-3211	0% [11]	This issue is triggering / triggered by Issue A
Follows	Follow	Temporal/Causal	Jira, JiraEcosystem	SRCTREEWIN-13081 | UPM-6027	0.0% [42], 0.8%	This issue follows / is followed by / Follow up to / Followed up by Issue A
Sequence	Follow	Temporal/Causal	RedHat	WINDUP-2345	4.2%	This issue follows up on / is followed up by Issue A
Implement	Implement	Workflow	IntelDAOS	DAOS-5377	0.1% [3]	This issue implements / is implemented by Issue A
Implements	Implement	Workflow	Sonatype	OSSRH-44699	0.3% [11]	This issue implements / is implemented by Issue A
Issue split	Split	Composition	Hyperledger, Jira, JiraEcosystem, MariaDB, MongoDB, RedHat, Sonatype	IR-475 | CONFCLOUD-30161 | PLUGWEB-494 | MXS-2632 | WT-6718 | WFLY-13459 | OSSRH-62435	0.5%, 0.0% [1], 0.1% [10], 0.2% [22], 0.4%, 0.1% [104], 0.1% [5]	This issue split to / from Issue A
Split	Split	Composition	Jira, JiraEcosystem	JSWSERVER-20493, UPM-1329	0.2% [167], 1.1%	This issue split to / into / from Issue A
Work Breakdown	Split	Composition	Qt	QTVSADDINBUG-680	6.4%	This issue resulted in / from Issue A
Preceded By	Precede	Temporal/Causal	JiraEcosystem	AUI-4437	0.1% [7]	This issue Precedes / Preceded By
Reference	Relate	General Relation	Apache, Jira, JiraEcosystem	ZOOKEEPER-4269 | SRCTREEWIN-12705 | VOTE-21	27.1%, 63.6%, 1.3%	This issue relates to / is related to Issue A
Relate	Relate	General Relation	Jira, JiraEcosystem, Sakai, Spring	JSWSERVER-14241 | UPM-3813 | YAFT-51 | XD-3010	0.3%, 22.0%, 48.7%, 40.9%	This issue relates to / is related to Issue A
Related	Relate	General Relation	Apache, IntelDAOS, Jira, MongoDB, RedHat, Spring	WAGON-324 | DAOS-6680 | JSWSERVER-766 | SERVER-56222 | XNIO-378 | SWS-586	1.4%, 12.1%, 0.0% [38], 49.1%, 26.6%, 6.9%	This issue relates to / is related to Issue A
Relates	Relate	General Relation	Hyperledger, MariaDB, Mindville, Qt, SecondLife, Sonatype	TX-20 | CONJ-720 | ICS-852 | QTVSADDINBUG-689 | STORM-702 | OSSRH-67761	17.1%, 51.1%, 43.2%, 22.4%, 29.4%, 38.8%	This issue relates to / is related to Issue A
Relationship	Relate	General Relation	JFrog	TCAP-329	27.2%	This issue relates to / is related to Issue A
Regression	Breaks	Workflow	Apache, Jira	ZOOKEEPER-2139 | SRCTREEWIN-12988	1.8%, 0.4%	This issue is broken by / breaks / is a regression of / has a regression in Issue A
Replacement	Replace	Duplication	Qt	QTSOLBUG-73	7.1%	This issue is replaced by / replaces Issue A
Required	Require	Temporal/Causal	Apache	ZOOKEEPER-4074	1.4%	This issue requires / is required by Issue A
Supercedes	Supercede	Workflow	Apache, Sonatype	ZOOKEEPER-4203 | OSSRH-67188	1.3%, 2.4%	This issue supercedes / is superceded by Issue A
Supersede	Supercede	Workflow	Spring	XD-718	3.3%	This issue supersedes / is superseded by Issue A
Supersession	Supercede	Workflow	Jira	SRCTREEWIN-341	0.5%	This issue supersedes / is superseded by Issue A
Test	Test	Workflow	Qt	QTQAINFRA-3727	0.1% [47]	This issue tests / is tested by Issue A
Tested	Test	Workflow	MongoDB	WT-4330	0.1% [48]	This issue is testing / is tested by Issue A
Trigger	Trigger	Workflow	JFrog	BI-367	6.3%	This issue triggered / was triggered by Issue A
Parent-Relation	Parent-Child	Composition	RedHat	STOR-578, STOR-577, STOR-551	0.2% [254]	Special issue property

Original	First Map	Category	Used by	Examples	Frequencies in %	Semantics in ITS
Subtask	Subtask	Composition	Apache, Hyperledger, IntelDAOS, JFrog, Jira, JiraEcosystem, MariaDB, MongoDB, Qt, RedHat, Sakai, SecondLife, Sonatype, Spring	ZOOKEEPER-3844 | IS-192 | DAOS-5553 | RTFACT-1132 | CLOUD-3218 | UPM-2179 | MCOL-2088 | COMPASS-4513 | QTQAINFRA-4365 | WINDUPRULE-520 | EVALSYS-204 | STORM-2142 | NEXUS-1210 | XD-3624	32.5%, 27.6%, 5.8%, 36.3%, 2.5%, 20.4%, 6.1%, 1.6%, 23.8%, 20.4%, 17.6%, 31.0% , 13.4%, 49.8%	Special issue property
Epic-Relation	Epic	Composition	Apache, Hyperledger, IntelDAOS, JiraEcosystem, MariaDB, MongoDB, Qt, Sonatype, Spring	USERGRID-1244 | BE-10 | DAOS-6679, DAOS-4790 | UPM-6013 | CONJ-138, CONJ-26 | TOOLS-1991 | QTQAINFRA-4365, QTBUG-74049 | NEXUS-22147, NEXUS-23080 | XD-2629, XD-3714	4.9%, 39.7%, 65.7%, 23.1%, 6.4%, 6.3%, 13.2%, 0.2% [9], 11.3%	Special issue property