

ZooKeeper 3.0.0 Release Notes

by

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These release notes include new developer and user facing incompatibilities, features, and major improvements.

- [Migration Instructions](#)
- [Changes](#)

1 Migration Instructions when Upgrading to 3.0.0

You should only have to read this section if you are upgrading from a previous version of ZooKeeper to version 3.0.0, otw skip down to [changes](#)

A small number of changes in this release have resulted in non-backward compatible Zookeeper client user code and server instance data. The following instructions provide details on how to migrate code and data from version 2.2.1 to version 3.0.0.

Note: ZooKeeper increments the major version number (major.minor.fix) when backward incompatible changes are made to the source base. As part of the migration from SourceForge we changed the package structure (com.yahoo.zookeeper.* to org.apache.zookeeper.*) and felt it was a good time to incorporate some changes that we had been withholding. As a result the following will be required when migrating from 2.2.1 to 3.0.0 version of ZooKeeper.

- [Migrating Client Code](#)
- [Migrating Server Data](#)
- [Migrating Server Configuration](#)

1.1 Migrating Client Code

The underlying client-server protocol has changed in version 3.0.0 of ZooKeeper. As a result clients must be upgraded along with serving clusters to ensure proper operation of the system (old pre-3.0.0 clients are not guaranteed to operate against upgraded 3.0.0 servers and vice-versa).

1.1.1 Watch Management

In previous releases of ZooKeeper any watches registered by clients were lost if the client lost a connection to a ZooKeeper server. This meant that developers had to track watches they were interested in and reregister them if a session disconnect event was received. In this release the client library tracks watches that a client has registered and reregisters the watches when a connection is made to a new server. Applications that still manually reregister interest should continue working properly as long as they are able to handle unsolicited watches. For example, an old application may register a watch for /foo and /goo, lose the connection, and reregister only /goo. As long as the application is able to receive a notification for /foo, (probably ignoring it) it does not need to be changed. One caveat to the watch management:

it is possible to miss an event for the creation and deletion of a znode if watching for creation and both the create and delete happens while the client is disconnected from ZooKeeper.

This release also allows clients to specify call specific watch functions. This gives the developer the ability to modularize logic in different watch functions rather than cramming everything in the watch function attached to the ZooKeeper handle. Call specific watch functions receive all session events for as long as they are active, but will only receive the watch callbacks for which they are registered.

1.1.2 Java API

1. The java package structure has changed from **com.yahoo.zookeeper*** to **org.apache.zookeeper***. This will probably effect all of your java code which makes use of ZooKeeper APIs (typically import statements)
2. A number of constants used in the client ZooKeeper API were re-specified using enums (rather than ints). See [ZOOKEEPER-7](#), [ZOOKEEPER-132](#) and [ZOOKEEPER-139](#) for full details
3. [ZOOKEEPER-18](#) removed KeeperStateChanged, use KeeperStateDisconnected instead

Also see [the current java API](#)

1.1.3 C API

1. A number of constants used in the client ZooKeeper API were renamed in order to reduce namespace collision, see [ZOOKEEPER-6](#) for full details

1.2 Migrating Server Data

The following issues resulted in changes to the on-disk data format (the snapshot and transaction log files contained within the ZK data directory) and require a migration utility to be run.

- [ZOOKEEPER-27 Unique DB identifiers for servers and clients](#)
- [ZOOKEEPER-32 CRCs for ZooKeeper data](#)
- [ZOOKEEPER-33 Better ACL management](#)
- [ZOOKEEPER-38 headers \(version+\) in log/snap files](#)

The following must be run once, and only once, when upgrading the ZooKeeper server instances to version 3.0.0.

Note:

The <dataLogDir> and <dataDir> directories referenced below are specified by the *dataLogDir* and *dataDir* specification in your ZooKeeper config file respectively. *dataLogDir* defaults to the value

of `dataDir` if not specified explicitly in the ZooKeeper server config file (in which case provide the same directory for both parameters to the upgrade utility).

1. Shutdown the ZooKeeper server cluster.
2. Backup your `<dataLogDir>` and `<dataDir>` directories
3. Run upgrade using
 - `bin/zkServer.sh upgrade <dataLogDir> <dataDir>`
 or
 - `java -classpath pathtozoo4j:pathtozookeeper.jar UpgradeMain <dataLogDir> <dataDir>`

where `<dataLogDir>` is the directory where all transaction logs (`log.*`) are stored.
`<dataDir>` is the directory where all the snapshots (`snapshot.*`) are stored.

4. Restart the cluster.

If you have any failure during the upgrade procedure keep reading to sanitize your database. This is how upgrade works in ZooKeeper. This will help you troubleshoot in case you have problems while upgrading

1. Upgrade moves files from `<dataLogDir>` and `<dataDir>` to `<dataLogDir>/version-1/` and `<dataDir>/version-1` respectively (version-1 sub-directory is created by the upgrade utility).
2. Upgrade creates a new version sub-directory `<dataDir>/version-2` and `<dataLogDir>/version-2`
3. Upgrade reads the old database from `<dataDir>/version-1` and `<dataLogDir>/version-1` into the memory and creates a new upgraded snapshot.
4. Upgrade writes the new database in `<dataDir>/version-2`.

Troubleshooting.

1. In case you start ZooKeeper 3.0 without upgrading from 2.0 on a 2.0 database - the servers will start up with an empty database. This is because the servers assume that `<dataDir>/version-2` and `<dataLogDir>/version-2` will have the database to start with. Since this will be empty in case of no upgrade, the servers will start with an empty database. In such a case, shutdown the ZooKeeper servers, remove the version-2 directory (remember this will lead to loss of updates after you started 3.0.) and then start the upgrade procedure.
2. If the upgrade fails while trying to rename files into the version-1 directory, you should try and move all the files under `<dataDir>/version-1` and `<dataLogDir>/version-1` to `<dataDir>` and `<dataLogDir>` respectively. Then try upgrade again.
3. If you do not wish to run with ZooKeeper 3.0 and prefer to run with ZooKeeper 2.0 and have already upgraded - you can run ZooKeeper 2 with the `<dataDir>` and `<dataLogDir>`

directories changed to <dataDir>/version-1 and <dataLogDir>/version-1. Remember that you will lose all the updates that you made after the upgrade.

1.3 Migrating Server Configuration

There is a significant change to the ZooKeeper server configuration file.

The default election algorithm, specified by the *electionAlg* configuration attribute, has changed from a default of *0* to a default of *3*. See [Cluster Options](#) section of the administrators guide, specifically the *electionAlg* and *server.X* properties.

You will either need to explicitly set *electionAlg* to its previous default value of *0* or change your *server.X* options to include the leader election port.

2 Changes Since ZooKeeper 2.2.1

Version 2.2.1 code, documentation, binaries, etc... are still accessible on [SourceForge](#)

Issue	Notes
ZOOKEEPER-43	Server side of auto reset watches.
ZOOKEEPER-132	Create Enum to replace CreateFlag in ZooKeeper.create method
ZOOKEEPER-139	Create Enums for WatcherEvent's KeeperState and EventType
ZOOKEEPER-18	keeper state inconsistency
ZOOKEEPER-38	headers in log/snap files
ZOOKEEPER-8	Stat enhanced to include num of children and size
ZOOKEEPER-6	List of problem identifiers in zookeeper.h
ZOOKEEPER-7	Use enums rather than ints for types and state
ZOOKEEPER-27	Unique DB identifiers for servers and clients
ZOOKEEPER-32	CRCs for ZooKeeper data
ZOOKEEPER-33	Better ACL management
ZOOKEEPER-203	fix datadir typo in releasenotes
ZOOKEEPER-145	write detailed release notes for users migrating from 2.x to 3.0
ZOOKEEPER-23	Auto reset of watches on reconnect

Issue	Notes
ZOOKEEPER-191	forrest docs for upgrade.
ZOOKEEPER-201	validate magic number when reading snapshot and transaction logs
ZOOKEEPER-200	the magic number for snapshot and log must be different
ZOOKEEPER-199	fix log messages in persistence code
ZOOKEEPER-197	create checksums for snapshots
ZOOKEEPER-198	apache license header missing from FollowerSyncRequest.java
ZOOKEEPER-5	Upgrade Feature in Zookeeper server.
ZOOKEEPER-194	Fix terminology in zookeeperAdmin.xml
ZOOKEEPER-151	Document change to server configuration
ZOOKEEPER-193	update java example doc to compile with latest zookeeper
ZOOKEEPER-187	CreateMode api docs missing
ZOOKEEPER-186	add new "releasenotes.xml" to forrest documentation
ZOOKEEPER-190	Reorg links to docs and navs to docs into related sections
ZOOKEEPER-189	forrest build not validated xml of input documents
ZOOKEEPER-188	Check that election port is present for all servers
ZOOKEEPER-185	Improved version of FLETest
ZOOKEEPER-184	tests: An explicit include directive is needed for the usage of memcpy functions
ZOOKEEPER-183	Array subscript is above array bounds in od_completion, src/cli.c.
ZOOKEEPER-182	zookeeper_init accepts empty host-port string and returns valid pointer to zhandle_t.
ZOOKEEPER-17	zookeeper_init doc needs clarification

Issue	Notes
ZOOKEEPER-181	Some Source Forge Documents did not get moved over: javaExample, zookeeperTutorial, zookeeperInternals
ZOOKEEPER-180	Placeholder sections needed in document for new topics that the umbrella jira discusses
ZOOKEEPER-179	Programmer's Guide "Basic Operations" section is missing content
ZOOKEEPER-178	FLE test.
ZOOKEEPER-159	Cover two corner cases of leader election
ZOOKEEPER-156	update programmer guide with acl details from old wiki page
ZOOKEEPER-154	reliability graph diagram in overview doc needs context
ZOOKEEPER-157	Peer can't find existing leader
ZOOKEEPER-155	improve "the zookeeper project" section of overview doc
ZOOKEEPER-140	Deadlock in QuorumCnxManager
ZOOKEEPER-147	This is version of the documents with most of the [tbd...] scrubbed out
ZOOKEEPER-150	zookeeper build broken
ZOOKEEPER-136	sync causes hang in all followers of quorum.
ZOOKEEPER-134	findbugs cleanup
ZOOKEEPER-133	hudson tests failing intermittently
ZOOKEEPER-144	add toString support for watcher event, and enums for event type/state
ZOOKEEPER-21	Improve zk ctor/watcher
ZOOKEEPER-142	Provide Javadoc as to the maximum size of the data byte array that may be stored within a znode
ZOOKEEPER-93	Create Documentation for Zookeeper
ZOOKEEPER-117	threading issues in Leader election

Issue	Notes
ZOOKEEPER-137	client watcher objects can lose events
ZOOKEEPER-131	Old leader election can elect a dead leader over and over again
ZOOKEEPER-130	update build.xml to support apache release process
ZOOKEEPER-118	findbugs flagged switch statement in followerrequestprocessor.run
ZOOKEEPER-115	Potential NPE in QuorumCnxManager
ZOOKEEPER-114	cleanup ugly event messages in zookeeper client
ZOOKEEPER-112	src/java/main ZooKeeper.java has test code embedded into it.
ZOOKEEPER-39	Use Watcher objects rather than boolean on read operations.
ZOOKEEPER-97	supports optional output directory in code generator.
ZOOKEEPER-101	Integrate ZooKeeper with "violations" feature on hudson
ZOOKEEPER-105	Catch Zookeeper exceptions and print on the stderr.
ZOOKEEPER-42	Change Leader Election to fast tcp.
ZOOKEEPER-48	auth_id now handled correctly when no auth ids present
ZOOKEEPER-44	Create sequence flag children with prefixes of 0's so that they can be lexicographically sorted.
ZOOKEEPER-108	Fix sync operation reordering on a Quorum.
ZOOKEEPER-25	Fuse module for Zookeeper.
ZOOKEEPER-58	Race condition on ClientCnxn.java
ZOOKEEPER-56	Add clover support to build.xml.
ZOOKEEPER-75	register the ZooKeeper mailing lists with nabble.com
ZOOKEEPER-54	remove sleeps in the tests.
ZOOKEEPER-55	build.xml fails to retrieve a release number from SVN and the ant target "dist" fails

Issue	Notes
ZOOKEEPER-89	invoke WhenOwnerListener.whenNotOwner when the ZK connection fails
ZOOKEEPER-90	invoke WhenOwnerListener.whenNotOwner when the ZK session expires and the znode is the leader
ZOOKEEPER-82	Make the ZooKeeperServer more DI friendly.
ZOOKEEPER-110	Build script relies on svnant, which is not compatible with subversion 1.5 working copies
ZOOKEEPER-111	Significant cleanup of existing tests.
ZOOKEEPER-122	Fix NPE in jute's Utils.toCSVString.
ZOOKEEPER-123	Fix the wrong class is specified for the logger.
ZOOKEEPER-2	Fix synchronization issues in QuorumPeer and FastLeader election.
ZOOKEEPER-125	Remove unwanted class declaration in FastLeaderElection.
ZOOKEEPER-61	Address in client/server test cases.
ZOOKEEPER-75	cleanup the library directory
ZOOKEEPER-109	cleanup of NPE and Resource issue nits found by static analysis
ZOOKEEPER-76	Commit 677109 removed the cobertura library, but not the build targets.
ZOOKEEPER-63	Race condition in client close
ZOOKEEPER-70	Add skeleton forrest doc structure for ZooKeeper
ZOOKEEPER-79	Document jacob's leader election on the wiki recipes page
ZOOKEEPER-73	Move ZK wiki from SourceForge to Apache
ZOOKEEPER-72	Initial creation/setup of ZooKeeper ASF site.
ZOOKEEPER-71	Determine what to do re ZooKeeper Changelog
ZOOKEEPER-68	parseACLs in ZooKeeper.java fails to parse elements of ACL, should be lastIndexOf rather than IndexOf
ZOOKEEPER-130	update build.xml to support apache release process.

Issue	Notes
ZOOKEEPER-131	Fix Old leader election can elect a dead leader over and over again.
ZOOKEEPER-137	client watcher objects can lose events
ZOOKEEPER-117	threading issues in Leader election
ZOOKEEPER-128	test coverage on async client operations needs to be improved
ZOOKEEPER-127	Use of non-standard election ports in config breaks services
ZOOKEEPER-53	tests failing on solaris.
ZOOKEEPER-172	FLE Test
ZOOKEEPER-41	Sample startup script
ZOOKEEPER-33	Better ACL management
ZOOKEEPER-49	SetACL does not work
ZOOKEEPER-20	Child watches are not triggered when the node is deleted
ZOOKEEPER-15	handle failure better in build.xml:test
ZOOKEEPER-11	ArrayList is used instead of List
ZOOKEEPER-45	Restructure the SVN repository after initial import
ZOOKEEPER-1	Initial ZooKeeper code contribution from Yahoo!

Table 1: Changes Since ZooKeeper 2.2.1