



## **Splunk Release Notes**

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# What's New

## What's new in Splunk 3.2

### What's new in Splunk 3.2

#### Transaction search

Many data sources generate multiple, related log entries for a single observable event. For example, an order transaction generates log entries on multiple servers: on the Web front end, the application server, and the back-end database. Splunk now provides a way to reference these events as one unit - as a transaction. This enables various types of new and improved analysis. You can now see transactions as one unit on screen. No need for you to have to stitch individual events together manually. You can do statistical analysis and queries on entire transactions such as: What is the average transaction execution time? Did all transactions complete? These queries are now simple to write.

For more information, refer to Use transaction search in the User Guide.

#### Filesystem change monitoring

Splunk's filesystem change monitoring opens up vast new possibilities to capture one of the most important vectors in IT Compliance and IT Operations: change. Identify configuration changes in real time, monitor live IT data feeds, and specify alerting to pinpoint availability problems in your infrastructure like never before. Report on change to your compliance auditors as well, all without additional agents or complex software.

For more information, refer to How the file system change monitor works in the Administration Guide.

#### REST API

The Splunk Platform is built on Splunk's new REST API. Developers can integrate with and build applications for Splunk more quickly and easily than ever before with an API that supports Splunk SDKs for .NET, Python and other languages. Simple, easy to use API calls inside a programmatic REST structure with Atom syndication encourage rapid development and place the power of IT data inside your applications.

For more information, refer to Splunk's REST API in the Developer Guide.

### **Windows platform support**

Splunk now supports installation on the majority of Windows operating systems currently deployed today with all of the great Splunk features offered on other platforms, including native support for the Windows event log. Windows administrators and those who have standardized on Microsoft technologies can now harness the power of Splunk!

To get started with Splunk on Windows, refer to the Windows installation in the Installation Guide.

### **Interactive event type learning**

The power of event type learning is put into your hands. Based on a specific search result, you can tell Splunk to learn new event types and store them in the system with the appropriate tags.

For more information, refer to Event type discovery in the Administration Guide.

### **Interactive field extraction**

You can now use Splunk Web to define new field extractions as soon as you see an event that needs them. Define your fields as you need them!

For more information, refer to Create extracted fields in the Administration Guide

### **Increased storage efficiency**

Splunk 3.2 delivers significant increases in storage efficiency over previous releases. With standard syslog, Splunk offers 15% greater efficiency in its indexed datastore, making syslog data consume just 25% of raw data size. Save space and money while unlocking the power of your IT data!

### **Flexible roles**

Flexible roles provide streamlined management of user permissions, personalization and content in large environments with hundreds of users and via integration with LDAP meet corporate standards for central management of users and permissions.

Administrators can define new roles that control data access and user capabilities in one location and then map them into role contexts in external authentication systems.

For more information, refer to [Configure roles in the Administration Guide](#).

#### **Auditing & signing**

Auditing and signing make it easy to demonstrate the integrity of IT data for compliance purposes and to present IT data as legally admissible evidence. Splunk can automatically determine the integrity of any IT data and its own configuration through cryptographic signing and granular auditing of user and administrator activity.

For more information, refer to [Audit event signing in the Administration Guide](#).

#### **Transaction typing**

Transaction typing lets you name specific patterns of events. You can express patterns of events by either defining sequence in which the individual events making up a transaction have to happen, or by using the transaction discoverer (`transaction` command) to discover transactions automatically. An example of a transaction could be: an attack detected by an intrusion detection system, followed by a specific event, recorded in the operating system log file on the targeted machine. Together, these events make up a "transaction". Once you define a transaction, you can then search it and do operations on it as if it were a single event.

For more information, refer to [How transaction types work in the Administration Guide](#).

#### **New search features**

Splunk's new search features greatly improve the overall capabilities of Splunk:

- Summarize or abbreviate larger, more complex searches with a single command (search macros).
- De-duplicate results to see only one example of events that have identical content (using the `dedup` command).
- Iterate over a set of results and apply the results to a new search (using the `map` command).
- Find events surrounding other events (using the `localize` command).
- Apply a regular expression to extract fields at search time (using the `rex` command).
- Eliminate the need for the `where` command in most searches by making the `search` command more powerful.

### **Role-based search sharing**

Extend the power of IT search within your team. Share your searches with different roles inside Splunk to deliver senior analyst troubleshooting knowledge into the hands of junior administrators. Reduce MTTR and empower your whole team to collaborate on new ways to pinpoint problems.

For more information, refer to [Set up saved searches](#) in the Administration Guide.

### **Live Tail**

View live log data from multiple, distributed servers and applications from a central location. You don't need to log into multiple servers, know where the servers live, how to access them, or what log files to look at. Splunk's new Live Tail provides one interface to all the data.

For more information, refer to [Use Live Tail](#) in the User Guide.

### **Dynamic event rendering**

Tell Splunk how to display events based on each event's properties. Event rendering lets you specify coloring and additional text labels for Splunk to show for specific events.

For more information, refer to [Dynamic event rendering](#) in the Administration Guide.

### **Universal field tagging**

Define tags for any field in Splunk. In addition to letting you tag the core fields (source, sourcetype, eventtypes, and hosts), you can tag any other extracted or indexed fields.

For more information, refer to [Tag fields](#) in the User Guide.

### **Pluggable authentication API**

Integrate Splunk with your existing authentication systems. By using the new pluggable authentication API, it's simple to integrate with a wide variety of external authentication solutions. This will enable integration with virtually any existing authentication method including PAM and kerberos. Leverage existing role contexts inside Splunk for both data access and administrative control and enhance the security of your Splunk deployment.

## **Event type templates**

Event type templates provide the ability to specify fields within a given event pattern that Splunk will automatically use to generate new event types. For example, for Windows events, you can specify that Splunk use the event ID field to generate a unique event type for each event ID seen, without needing to specify a separate event type manually for each event ID.

For more information, refer to Event type templates in the Administration Guide.

## **Asynchronous search via the CLI dispatch command**

The Splunk CLI now allows you to run multiple searches asynchronously using the dispatch CLI command. Dispatch allows to execute searches that can run for a long time. They can be dispatched into the background and the results can be retrieved at a later point in time. In addition, dispatch eliminates limitations of a maximum number of events passed between commands, enabling reporting over large amounts of data.

For more information, refer to the dispatch CLI command in the User Guide.

# Known Issues

## Known Issues for release 3.2.3

### Known Issues for release 3.2.3

This page contains known issues and workarounds for this release of Splunk.

### General issues and considerations

This section contains general considerations, issues and workarounds for this release of Splunk.

- If you have configured timestamp offsets using pre-Splunk 3.2 POSIX instructions, you must reconfigure them using this information. If you do not do this, your timestamp information will be incorrect. If you have not configured timezone offsets, you can ignore this note.
- Live tail is a powerful feature, and as such can tax system resources. For this reason, Splunk defaults to only allowing you to run one Live Tail at a time. However, you can edit `web.conf` to allow for multiple Live Tails. You must enable HTTP pipelining for this to function correctly. Refer to `web.conf` for more details. (SPL-11839)
- If you are using Splunk Deployment server, you must upgrade it to match all your Splunk instances. Mixed version environments are not supported.
- If you are running two different instances of Splunk on one machine, you cannot log into both instances at once, even with different shell sessions. However, you can use the `-auth` option in your search string to provide credentials for a different user on the fly. (SPL-11924)
- Splunk's authentication module does not work with Domino LDAP.
- 2.0.x licenses will NEVER work with 3.x+. If you have a current Plus Support contract you are entitled to upgrade your license to 3.x. If you do not have a current support agreement in place please contact [sales@splunk.com](mailto:sales@splunk.com).
- The File System Change Monitor does not monitor directories, only the contents of those directories. If an empty directory is deleted, renamed, or otherwise changed, you will not receive an alert. However, if any file in the directory is changed, you will receive an alert.
- If you switch from LDAP authentication to Splunk's built-in authentication, you must restart from the command line before you can log in again. (SPL-11737)
- The `$SPLUNK_HOME/share/splunk/search_oxiclean/rss` directory is installed with incorrect permissions. You must enable write permissions for this directory so that RSS feed pages can be created. (SPL-10695)
- You cannot specify a relative path when setting `$SPLUNK_DB`. (SPL-11867)
- Export and import of user data may not work properly.
- Log file rotation does not currently work while tailing SMB mounts. Work around this by mounting as CIFS.
- Upgrading using `rpm` does not create a `etc.bak` file.
- Some SUSE 10.x users might experience incorrectly displayed dialog boxes and searches may return the message "Unable to get a properly formatted response from the server; canceling the current search." This is a problem with the `mime.types` configuration. Instructions on how to correct this problem can be found [here](#).

- Live tail does not currently respect the use of `srchfilter` within a role. To prevent users from accessing restricted information, explicitly disable Live tail in their user role. (SPL-13534)
- When configuring an LDAP server, you must specify a valid value for `groupNameAttribute` (= cn) in `authentication.conf` or `splunkd` will crash. (SPL-13562)
- When tailing a directory containing multiple sources, Splunk will index binary files if you are using a custom source type. To work around this, use automatic sourcetype when tailing directories. This issue will be resolved in an upcoming maintenance release. (SPL-13384)
- When using deployment server, you need to use a full path for `serverClassPath` (`serverClassPath=/opt/splunk/etc/modules/distributedDeployment/classse`) (SPL-13954)
- "splunk start monitor" give an error. To start with the monitor, start `splunkmon` directly with `splunkmon <path/to/splunk_home>` (SPL-13532)

#### Windows-specific considerations and known issues

As a result of porting Splunk to the Windows platform, some functionality is not available or works differently due to platform differences or limitations:

- FIFO data inputs are not supported
- 'Watch and symlink' operation is not supported with file-based data inputs.
- Specifying mapped paths that include drive letters (such as C:\) are not supported. To work around this, use a full UNC path to the network resource (in the form `\\servername\full\path\to\resource`). Splunk must be running as a user with Admin privileges on the network. (SPL-11690)
- The `exporttool` function does not support exporting to the original source, but does support export to csv.
- You must use two backslashes `\\` to escape wildcards in stanza names in `inputs.conf`.
- Regexes with backslashes in them are not currently supported when specifying paths to files. (SPL-12679)
- The Windows installation package does not include the sample data (referred to in the tutorial portion of the User Guide) that is included on other platforms.
- The Windows release has only be tested on English versions of the operating system. Foreign language versions are currently unsupported.

#### Search issues, including deprecated commands

- The `readlevel` and `readlimit` modifiers are deprecated as of version 3.2. Splunk now handles the verbosity of events intelligently with no need for specification.
- The `maxresults` and `maxtime` modifiers have been deprecated. If you have saved searches that use `maxresults`, they will no longer function in 3.2.
  - ◆ Use the **Preferences** menu in Splunk Web to configure these values.
  - ◆ From within the CLI, use of `maxresults` has changed from being inside your query (for example, `splunk search "search foo maxresults::100"`) to being outside your query (for example, `splunk search "foo" -maxresults 100`).
- The `remote` command is deprecated.
  - ◆ In Splunk Web, perform `remote` functionality in the Distributed tab of the Admin interface.
  - ◆ Click **Admin** in the upper-right corner of Splunk Web.

- ◆ Click **Distributed** from the Distributed tab to turn on Distributed searching and then restart the server.
- ◆ Add the servers you want search requests to be distributed to.
- ◆ Restart Splunk. Once you restart Splunk, all search requests are sent to the servers you specify in the list.
- ◆ In the CLI, use the `dispatch` command to execute `remote` functionality. You must have distributed search configured prior to running `dispatch`.
- The `header` argument for the `diff` command has no effect; the header data is always displayed.
- Performing multiple searches at once from the Web UI can occasionally return a "search was canceled" error.
- Searches that operate on large events, such as configuration files and tabular data (top/ps output, logs containing multi-line events), can stress the memory available on 32-bit systems. Splunk recommends that you reduce the maximum number of results from the **Preferences** menu in Splunk Web or consider searching asynchronously using the command line interface when you are performing these types of searches. This issue can be compounded in distributed search scenarios, where the pool for results is greater. Additionally, the optimizations Splunk applies when displaying non-distributed search results are not available when performing distributed searches; this will also affect memory consumption.
- The `savedsearch` modifier does not work if search terms contains a | (pipe). (SPL-13198)
- Eventtypes with complex phrasing are searchable but not reportable.
- Event type attribute values are case-sensitive. This does not affect keywords, only attribute values.

#### Distributed search issues and considerations

- If you are adding or changing a license on any server in your distributed cluster, restart all of them to ensure that they display correctly on each others' dashboards. (SPL-12122)
- Autodiscovery of hosts for distributed search is unreliable.
- If you are using Splunk in a distributed search cluster, you must upgrade each node to exactly the same version of Splunk; mixing 3.1.x and 3.2.x nodes in a distributed search cluster is not supported. You must upgrade all 3.1.x nodes to 3.2.x.\* In the deployment server, the 'default' class is supposed to target all deployment clients; however, configuration files placed in the default directory on the deployment server do not get pushed properly. (SPL-12350)

#### Splunk Web issues and considerations

- Splunk 3.2 requires Flash 9. (download). Flash is available for Firefox 1.5 and 2.0, and Internet Explorer 6 and 7. See the Adobe Flash system requirements. You can check which version of Flash you are running here.
- Firefox 3.0b1 will not currently display any data with Splunk Web. Please use Firefox 2.0.0.10 or earlier.
- If you create an event type that contains a space in the name and also specify tags for the event type at the same time, you cannot search on the tags.
- If you pipe into a saved search, time range specifications are ignored in Splunk Web. (SPL-12017)
- Section headers may sometimes display incorrectly in Splunk Web. (SPL-10138)
- If you are using IE7, you may experience inconsistent results in the timeline display. (SPL-11052)

- If you are using IE6, you may be prompted with an error dialog saying `Error: Can't move focus to the control because it is invisible, not enabled or of a type that does not accept the focus`. The workaround is to use Firefox or IE7 (SPL-13331)
- If you assign multiple graph types to a saved search, only the initial type is displayed, and when you re-run the search, no graph is displayed. (SPL-9893)
- Time ranges are not retained in snapshots.
- To specify a label for a report column that includes spaces (with quotes surrounding the label name), do not use `eval`. Use `rename` and specify it as the last search processor in your string. (SPL-12200)
- Some users have reported browser crashes with Firefox. Mac users who experience this are encouraged to submit CrashReporter logs from the Firefox crash. These can be found in `~/Library/Logs/CrashReporter`.
- If you upgrade from Splunk 3.1.x and have saved searches which you subsequently add to your dashboard, the chart type display option will be reset to the default, which is a bar chart. (24015)
- Values for `starttimeu` or `endtimeu` are not recognized in Splunk Web, but do function correctly in the CLI. (SPL-13141)
- The 3.2.3 release of Splunk includes a security fix that puts restrictions on how the `splunkweb` service acts. Some more unusual server configurations may experience unexpected behavior as a result. If your Splunk deployment includes a configuration that puts a Splunk server behind a rewriting proxy in an uncommon configuration (such as running multiple instances of Splunk server and exposing them all on the same domain), or routes a Splunk server through a rewriting proxy that modifies or filters HTTP cookie information, Splunk Web may not return search results. You will notice this immediately, as the default main dashboard will load empty frames. (SPL-13639)

#### Configuration considerations and issues

- Entries in `indexes.conf` are case sensitive, including the stanza name itself. (SPL-12063)
- Reusing a field name in `fields.conf` results in the field being undefined. (SPL-12008)
- Use `props.conf` to alter Splunk's settings. The `properties.xml` file is still included with the product, but its settings have no effect.

#### Splunk Toolbar considerations and issues

- The Splunk Toolbar sometimes incorrectly displays two drop-down arrows in the search box. This has no effect on functionality.
- When running a free Splunk license, or an unlicensed copy of Splunk, the toolbar may not get past the "Welcome to Splunk" start page.
- Occasionally a search done in the toolbar will not return results. This may cause the browser to hang. The searches will work correctly if run directly in Splunk Web or the command line (CLI).
- In some cases, the toolbar will prevent "Find in this page" functionality from running multiple times on the same page. These reports have been limited to users running multiple browser add-ons (e.g. colorful tabs, dom inspector, user agent switcher).
- Autologin does not work if the Autologin is set to **off** prior to configuring a Splunk server in the toolbar.
  - ◆ To login automatically set Autologin to **on** prior to configuring the server.
- The toolbar does not have a mechanism for alerting if its credentials are invalid.

- ◆ When a Splunk server is configured to talk to an LDAP server that locks accounts after N failed login attempts, users should verify that their credentials are correct.
- There are some cases where the toolbar may take over the current user session if the toolbar is configured to talk to a Splunk instance that is different than the one a user is currently logged into.
- There may be conflicts if a user is logged into one Splunk instance and runs a toolbar search on a different Splunk instance.

#### Scheduling a saved search with cron

- When using the Web UI, users are given a choice between 'Basic' and 'Cron' scheduling. With 'Cron' selected, the UI will validate the cron string before the search is saved, this validation will sometimes fail and indicate a problem with a perfectly valid cron string. If you experience this, please email the details to 'support@splunk.com'.
- This should not cause any problems for saved searches created via the CLI or modifications made directly through a savedsearches.conf file.

## Workaround for SSL configuration for users of Firefox 3

#### Workaround for SSL configuration for users of Firefox 3

**Caution:** The workaround described in this topic is not to be used in high-security environments, or any install that uses custom SSL certs. Custom SSL certificates are the only way to solve this issue in a security-conscious manner.

#### Background

Firefox 3 tightened its security defaults to deny any SSL certificates that are mismatched. By default, Splunk uses a self-signed SSL certificate with the following details:

- Issuer (signing authority): CN=SplunkCommonCA, O=Splunk
- Issued to: CN=SplunkServerDefaultCert, O=SplunkUser

Since SplunkCommonCA is not a trusted CA (like Verisign, Thawte, etc.) and 'SplunkServerDefaultCert' does not equal 'localhost', this is enough to trigger the security exception.

By adding the Splunk certificate to your browser's exception list, you are asserting that you trust this certificate/hostname combination.

#### Symptoms

This applies to environments that satisfy all of the following prerequisites:

1. Browsing via Firefox 3

2. Accessing Splunk version 3.2+

3. `splunkd` is set in `server.conf` to have `enableSplunkdSSL=true`

4. Hitting the `splunkd` management port directly from the browser, i.e. `https://localhost:8089/services`

- OR -

1. Browsing via Firefox 3

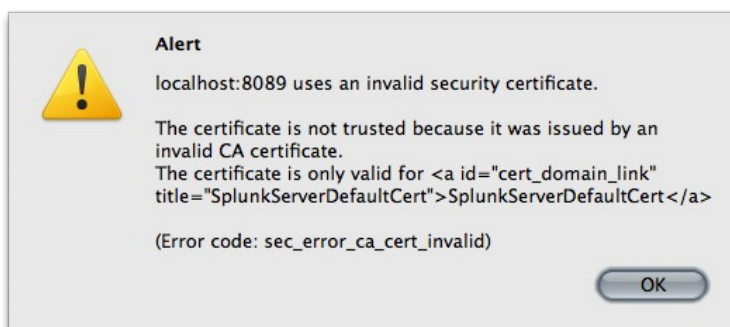
2. Accessing Splunk version 3.0+

3. `splunkweb` is set in `web.conf` to have `enableSplunkWebSSL=true`

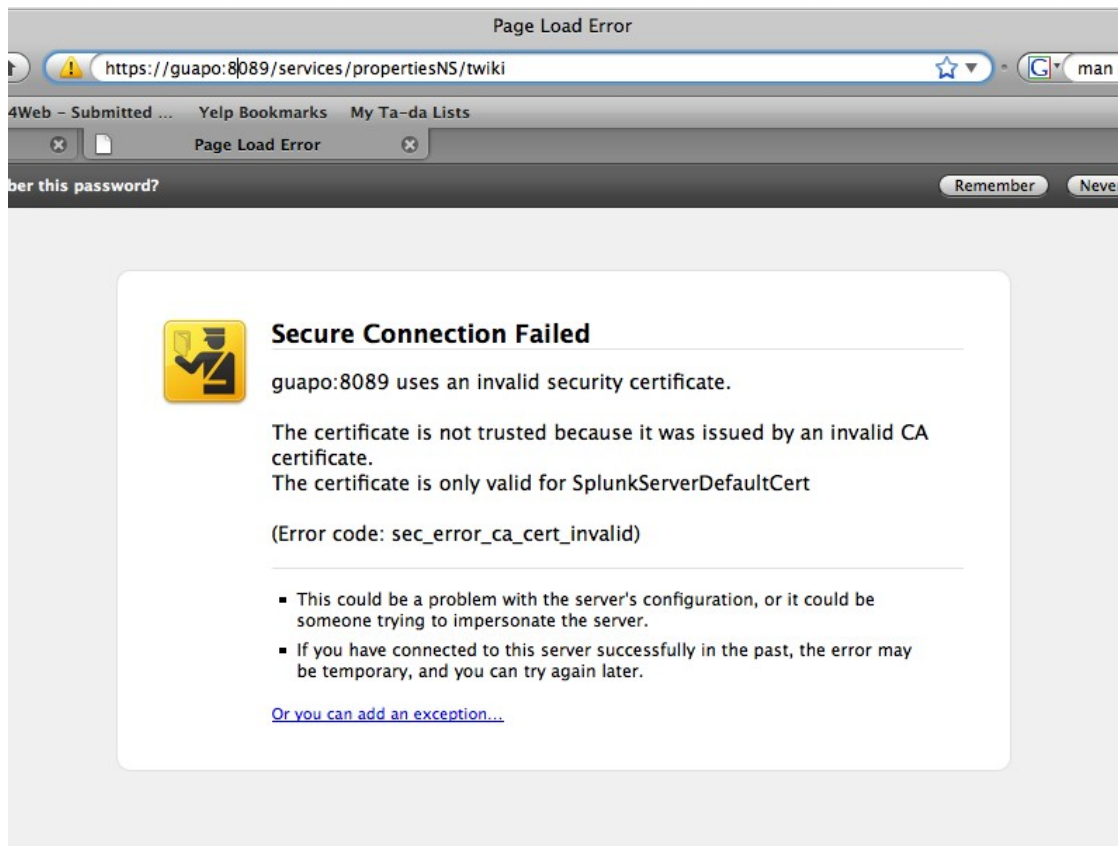
4. Hitting Splunk Web from the browser, for example: `https://localhost:8000`

When accessing the `splunkd` REST endpoints or SSL-enabled Splunk Web via Firefox 3, the browser returns with an 'invalid security exception' message. There are 2 manifestations of this error message:

**Message A:**



## Message B:



## Workaround

**Caution:** This workaround is not to be used in high-security environments, or any install that uses custom SSL certs. Custom SSL certificates are the only way to solve this issue in a security-conscious manner.

If your error message is like Message B, then you can skip to step 2.

### 1. Open the Certificate Manager

- Click the 'Firefox' menu.
- Select the 'Preferences' menu item.
- Click the 'Advanced' tab.
- Click the 'Encryption' tab.
- Click the 'View Certificates' button.

### 2. Add your splunkd certificate to the certificate exceptions

- Click the 'servers' tab
- Click the 'Add Exception...' button
- Copy/paste or type in the full URI of your `splunkd` server, for example, `https://localhost:8089`
- Click the 'Get Certificate' button (at this point, the certificate status page should show some info about the certificate).
- Click the 'Confirm Security Exception' button (You should now be back on the servers tab, with a new Splunk certificate listed).

# Changelogs by Version

## 3.2

3.2

This page contains a list of resolved issues from the last release of Splunk.

### Resolved issues from 3.1.5

- All admin searches now work.
- HTTPS export of events using IE6 and IE7 is now supported.
- Issues with epoch time have been resolved.
- Splunk Web now supports all advanced search syntax, including reporting on the results of a subsearch, set operations, and more.
- Deployment class changes for deployment clients are now properly reflected on the Deployment server.
- IP restrictions made using `BIND_SPLUNKIP` are now correctly enforced.
- Distributed search with `| multikv` now works correctly.
- Show all now works correctly in distributed mode.
- Splunk now inserts line breaks into HTML mail alerts to work around potential line limit issues in some mail clients.
- Issues with search parsing linefeed characters incorrectly have been resolved.
- The link sent with alert results now specifies the correct time window.
- Alerts containing results from advanced reporting operators (such as `top` and `timechart`) now contain the complete result set.
- When using `select`, all data is now treated as numeric data and will be handled appropriately.
- Export as csv now correctly exports all data.
- An issue with a missing symlink in the Solaris x86 version of Splunk has been addressed.
- Splunk Web display issues with saving reports in IE6 have been resolved.
- Updating saved searches on the dashboard now updates the dashboard correctly.

## 3.2.1

3.2.1

This page contains a list of issues resolved in this release of Splunk.

### Resolved issues from 3.2

- An issue with multiple field extraction syntax causing `splunkd` to crash has been resolved.
- An issue with the `cmd` command causing segmentation faults has been resolved.
- An issue with forwarders mis-timestamping events into the future has been resolved.
- Non-DST timezones are now handled properly.

- An issue with parsing of `_` and other capital letters in key names has been resolved.
- Editing users no longer results in a traceback.
- Highlighting of results now works correctly in distributed mode.
- An issue with the display of reporting on saved searches involving event types or tags has been resolved.
- Showing all lines now works correctly in IE.
- Specifying `KV_MODE=multi` is now supported correctly in `props.conf`.
- Timechart now uses local times for boundaries.
- Issues with rss alert notifications on Windows have been resolved.
- Saving a report in Splunk Web no longer removes reporting UI elements.
- An erroneous "unbalanced quotes" error in Splunk Web has been resolved.
- Alert scripts now take variables correctly.
- Splunk Web now recognizes non-standard database store directory locations.
- The `set server-type forwarder` command now works correctly.
- Windows Security events are now indexed correctly.
- Distributed search providers no longer display erroneous warnings about missing query IDs.
- Distributed search now returns complete result sets.
- The `file` command now sets metadata regarding source and sourcetype correctly
- RSS feeds are now displayed correctly from within Splunk Web.
- When defining key/value pairs, Splunk no longer includes quotes as part of the definition unless they are nested within an outer set of quotes. For example, `key=""` now defines an empty value.
- Daily indexing volume by server link now works correctly.
- Histograms saved to the dashboard now respect specified maximum event count.
- Subsearches are now supported in distributed environments.

## 3.2.2

### 3.2.2

This page contains a list of issues resolved in this release of Splunk.

#### Resolved issues from 3.2.1

- Splunk now calculates index size correctly. The directory size calculations Splunk performs when starting up now include raw data, and so many now take a little longer to complete if you have a large amount of data the first time you start Splunk. (SPL-12933)
- An issue with Splunk crashing at startup in timezones with non-DST offsets (GMT) has been resolved. (SPL-13072)
- Issues with mishandling of non-standard HTTP return codes have been addressed (SPL-12976, SPL-12960)
- Splunk no longer uses an inefficient memory allocator for Solaris installs. (SPL-12958)
- The `oldsearch delete` command now correctly deletes items regardless of whether you use it in Splunk Web or the CLI, but the IDs of the deleted items are not displayed if you use the command in Splunk Web. (SPL-13078)
- The `metadata` processor and access to the typeahead help can now be restricted to users based on their role. Refer to `authorize.conf` for details about the `get_metadata` and

- `get_typeahead` options. (SPL-13009, SPL-13007)
- Canceling searches across distributed hosts now works correctly. (SPL-12956)
- Using the `localize` search command without arguments no longer crashes `splunkd`. (SPL-12806)
- Searching for indexed fields with capital letters in the name now functions correctly. (SPL-12800)
- Clicking a field tab to open, then again to close no longer clears the fields picker. (SPL-12758)
- It is now possible to restart Splunk via Splunk Web even if a user response is required; `./splunk restart --answer-yes` functions as expected. (SPL-12623)
- Splunk Web now correctly reflects that distributed search is enabled when you enable it. (SPL-11937)

## 3.2.3

### 3.2.3

The following issues have been resolved in Splunk 3.2.3:

- An issue with incorrect timestamp offsets has been addressed: if you have configured timestamp offsets using pre-Splunk 3.2 POSIX instructions, you must reconfigure them using this information. If you do not do this, your timestamp information will be incorrect. If you have not configured timezone offsets, you can ignore this note.
- Saved searches now work correctly with scripted auth. (SPL-13016)
- You can now use wildcards on Windows when specifying paths to filenames in `inputs.conf`. You cannot, however, use backslashes within a regex in `inputs.conf`. For example, you can have `C:\fflanda\path\to\*\logfile.log`, but `\fflanda\*\d\logfile.log` will not work. (SPL-12679)
- Splunk now handles multi-line Windows events properly (multiple single line events or single multi-line events containing two or more actual events) when you specify the parsing queue on the indexer's TCP input. (SPL-12995)
- Installing Sparc package somewhere other than `opt/splunk` is now supported. (SPL-13187)
- You can now use a Unix deployment server to distribute configs to Windows clients. (SPL-12750, SPL-13124)
- Splunk Web now correctly validates alert cron schedules. (SPL-13328)

#### Resolved security issues

- A cross-site request forgery vulnerability has been resolved. (SPL-13318) Many thanks to `aaron@vttty.com` for identifying this issue.
- A security issue related to possible remote Denial of Service vulnerability of `splunkd` has been resolved. (SPL-13403) Many thanks to `aaron@vttty.com` for identifying this issue.
- The 3.2.3 release of Splunk includes a security fix that puts restrictions on how the `splunkweb` service acts. Some more unusual server configurations may experience unexpected behavior as a result. If your Splunk deployment includes a configuration that puts a Splunk server behind a rewriting proxy in an uncommon configuration (such as running multiple instances of Splunk server and exposing them all on the same domain), or routes a Splunk server through a rewriting proxy that modifies or filters HTTP cookie information,

Splunk Web may not return search results. You will notice this immediately, as the default main dashboard will load empty frames. (SPL-13639)

- A security issue related to permissions on custom bundle directories has been resolved. (SPL-12861)

# Credits

## Credits

### Credits

Splunk contains some libraries that were written by others, and are being redistributed as part of Splunk under their respective open source licenses. We wish to thank the contributors to these projects.

Licenses can be viewed by selecting a library name on the left.

## APSW

### APSW

- Another Python SQLite Wrapper

apsw-3.2.2-r1 7th July 2005

APSW provides an SQLite 3 wrapper that provides the thinnest layer over SQLite 3 possible. Everything you can do from the C API to SQLite 3, you can do from Python. Although APSW looks vaguely similar to the DBAPI, it is not compliant with that API and instead works the way SQLite 3 does. (pysqlite is DBAPI compliant - differences between apsw and pysqlite 2).

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## Download

You can download APSW from SourceForge. Debian users can grab the package python-apsw

## Example

This is an example of how to use apsw, and also demonstrates all the features.

```
import apsw

###

### Opening/creating database

###

connection=apsw.Connection("dbfile")

cursor=connection.cursor()
```

```
###
```

```
### simple statement
```

```
###
```

```
cursor.execute("create table foo(x,y,z)")
```

```
###
```

```
### multiple statements
```

```
###
```

```
cursor.execute("insert into foo values(1,2,3); create table bar(a,b,c) ; insert into foo val
```

```
###
```

```
### iterator
```

```
###
```

```
for x,y,z in cursor.execute("select x,y,z from foo"):
```

```
    print cursor.getdescription() # shows column names and declared types
```

```
print x,y,z

###

### iterator - multiple statements

###

for m,n,o in cursor.execute("select x,y,z from foo ; select a,b,c from bar"):

    print m,n,o

###

### bindings - sequence

###

cursor.execute("insert into foo values(?,?,?)", (7, 'eight', False))

cursor.execute("insert into foo values(?,?,?1)", ('one', 'two')) # nb sqlite does the number

###

### bindings - dictionary
```

```
###
```

```
cursor.execute("insert into foo values(:alpha, :beta, :gamma)", {'alpha': 1, 'beta': 2, 'gamma': 3})
```

```
###
```

```
### tracing execution
```

```
###
```

```
def mytrace(statement, bindings):
```

```
    "Called just before executing each statement"
```

```
    print "SQL:", statement
```

```
    if bindings:
```

```
        print "Bindings:", bindings
```

```
    return True # if you return False then execution is aborted
```

```
cursor.setexectrace(mytrace)
```

```
cursor.execute("create table bar(x,y,z); select * from foo where x=?", (3,))
```

```
SQL: create table bar(x,y,z);
```

```
SQL: select * from foo where x=?
```

```
Bindings: (3,)
```

```
###
```

```
### tracing results
```

```
###
```

```
def rowtrace(*results):
```

```
    """Called with each row of results before they are handed off.  You can return None to
```

```
    cause the row to be skipped or a different set of values to return"""
```

```
    print "Row:", results
```

```
    return results
```

```
cursor.setrowtrace(rowtrace)
```

```
for row in cursor.execute("select x,y from foo where x>3"):
```

```
pass
```

```
Row: (4, 'five')
```

```
Row: (7, 'eight')
```

```
###
```

```
### executemany
```

```
###
```

```
# (This will work correctly with multiple statements, as well as statements that
```

```
# return data. The second argument can be anything that is iterable.)
```

```
cursor.executemany("insert into foo (x) values(?)", ( [1], [2], [3] ) )
```

```
# You can also use it for statements that return data
```

```
for row in cursor.executemany("select * from foo where x=?", ( [1], [2], [3] ) ):
```

```
    print row
```

```
###
```

```
### defining your own functions

###

def ilove7(*args):

    "a scalar function"

    print "ilove7 got",args,"but I love 7"

    return 7

connection.createscalarfunction("seven", ilove7)

for row in cursor.execute("select seven(x,y) from foo"):

    print row

###

### aggregate functions are more complex

###

# here we return the longest item when represented as a string
```

```

def longeststep(context, *args):

    "are any of the arguments longer than our current candidate"

    for arg in args:

        if len( str(arg) ) > len( context['longest'] ):

            context['longest']=str(arg)

def longestfinal(context):

    "return the winner"

    return context['longest']

def longestfactory():

    """called for a new query. The first item returned can be

    anything and is passed as the context to the step

    and final methods. We use a dict."""

    return ( { 'longest': }, longeststep, longestfinal)

```

```

connection.createaggregatefunction("longest", longestfactory)

for row in cursor.execute("select longest(x) from foo"):

    print row

###

### Defining collations.

###

# The default sorting mechanisms don't understand numbers at the end of strings

# so here we define a collation that does

cursor.execute("create table s(str)")

cursor.executemany("insert into s values(?)",

                    ( ["file1"], ["file7"], ["file17"], ["file20"], ["file3"] ) )

for row in cursor.execute("select * from s order by str"):

    print row

```

```
('file1',)
```

```
('file17',)
```

```
('file20',)
```

```
('file3',)
```

```
('file7',)
```

```
def strnumcollate(s1, s2):
```

```
    # return -1 if s1<s2, +1 if s1>s2 else 0
```

```
    # split values into two parts - the head and the numeric tail
```

```
    values=[s1, s2]
```

```
    for vn,v in enumerate(values):
```

```
        for i in range(len(v), 0, -1):
```

```
            if v[i-1] not in "01234567890":
```

```
                break
```

```

try:

    v=( v[:i], int(v[i:]) )

except ValueError:

    v=( v[:i], None )

values[vn]=v

# compare

if values[0]<values[1]:

    return -1

if values[0]>values[1]:

    return 1

return 0

connection.createcollation("strnum", strnumcollate)

for row in cursor.execute("select * from s order by str collate strnum"):

```

```

print row

('file1',)

('file3',)

('file7',)

('file17',)

('file20',)

###

### Authorizer (eg if you want to control what user supplied SQL can do)

###

def authorizer(operation, paramone, paramtwo, databasename, triggerorview):

    """Called when each operation is prepared. We can return SQLITE_OK, SQLITE_DENY or

    SQLITE_IGNORE"""

    # find the operation name

```

```

ign=["SQLITE_OK", "SQLITE_DENY", "SQLITE_IGNORE"] # not operation names but have same v

print "AUTHORIZER:",

for i in dir(apsw):

    if getattr(apsw,i)==operation:

        print i,

        break

print paramone, paramtwo, databasename, triggerorview

if operation==apsw.SQLITE_CREATE_TABLE and paramone.startswith("private"):

    return apsw.SQLITE_DENY # not allowed to create tables whose names start with priva

return apsw.SQLITE_OK # always allow

connection.setauthorizer(authorizer)

###

### progress handler (SQLite 3 experimental feature)

```

```
###

# something to give us large numbers of random numbers

import random

def randomintegers(howmany):

    for i in xrange(howmany):

        yield (random.randint(0,9999999999),)

# create a table with 10,000 random numbers

cursor.execute("begin ; create table bigone(x)")

cursor.executemany("insert into bigone values(?)", randomintegers(10000))

cursor.execute("commit")

# display an ascii spinner

_phcount=0

_phspinner="|/-\\"
```

```

def progresshandler():

    global _phcount

    sys.stdout.write(_phspinner[_phcount%len(_phspinner)]+chr(8)) # chr(8) is backspace

    sys.stdout.flush()

    _phcount+=1

    time.sleep(0.1) # deliberate delay so we can see the spinner (SQLite is too fast otherwise)

    return 0 # returning non-zero aborts

# register progresshandler every 20 instructions

connection.setprogresshandler(progresshandler, 20)

# see it in action

print "spiny thing -> ",

for i in cursor.execute("select max(x) from bigone"):

    print # newline

```

```
print i # and the maximum number

###

### commit hook (SQLite3 experimental feature)

###

def mycommithook():

    print "in commit hook"

    hour=time.localtime()[3]

    if hour<8 or hour>17:

        print "no commits our of hours"

        return 1 # abort commits outside of 8am through 6pm

    print "commits okay at this time"

    return 0 # let commit go ahead

connection.setcommithook(mycommithook)
```

```
cursor.execute("begin; create table example(x,y,z); insert into example values (3,4,5) ; con
```

## Building

The simple way is:

```
python setup.py install
```

On Windows the above command uses Visual C++. You can use MinGW with the command below. (If MinGW complains about missing Python functions starting with `_imp__Py_` then run `mingwsetup.bat` which will ensure your Python distribution is initialized for MinGW compilation).

```
python setup.py build --compile=mingw32 install
```

By default whatever SQLite 3 you already have on your system is used. If you place a copy of the headers and library in a `sqlite3` subdirectory then that will be used instead. Here is a quick and easy way of doing everything on Linux/Mac or Windows with MinGW, including the SQLite library statically into the extension (ie no external DLLs/shared libraries will needed at runtime).

Download the SQLite 3 code. Use the version that has already been preprocessed. (It will con

```
$ mkdir sqlite3
```

```
$ cd sqlite3
```

```
$ unzip sqlite-source-3.2.2.zip
```

```
$ rm tclsqlite.c # Linux/Mac
```

```
$ del tclsqlite.c # Windows
```

```
$ gcc -DTHREADSAFE -O3 -c *.c # Adding -DNDEBUG will turn off assertions
# improve performance (about 25%) at the expense of some code size

$ ar r libsqlite3.a *.o

$ ranlib libsqlite3.a

$ cd ..

$ python setup.py install # Linux/Mac

$ python setup.py build --compile=mingw32 install # Windows
```

The extension just turns into a single file `apsw.so` (Linux/Mac) or `apsw.pyd` (Windows). You don't need to install it and can drop it into any directory that is more convenient for you and that your code can reach. To just do the build and not install, leave out `install` from the lines above and add `build` if it isn't already there.

## API Reference

Everything you can do from the SQLite 3 C API you can do from Python. The documentation below notes which C API functions are called where you can get further details on what happens. The only C function not implemented is `sqlite3_collation_needed`. (You can still add collations, you just can't use this function to find out about them on-demand.) Additionally `sqlite3_trace` is not wrapped but instead tracers are provided that have more functionality.

Some functions are marked experimental in the SQLite API. These have also been made available, but as the SQLite documentation notes these functions may change form or disappear in future

versions of SQLite. You can exclude these functions by commenting out the relevant line in the setup.py when building aspw.

Various methods create functions, collations and set various hooks and handlers. To remove the relevant function/collation/hook/handler, pass in None as the callable method.

## Module methods

### sqlitelibversion()

Returns the version of the SQLite library as a string. This function calls `sqlite3_libversion`

## Connection class

The connection class wraps a `sqlite3` pointer.

### Connection(filename)

Opens an SQLite database named `filename`. (This calls `sqlite3_open` behind the scenes and `sqlite3`

### cursor()

Creates a new cursor object on this database.

### changes()

This function returns the number of database rows that were changed (or inserted or deleted)

### totalchanges()

This function returns the total number of database rows that have be modified, inserted, or

## `last_insert_rowid()`

Returns the integer key of the most recent insert in the database. (This calls `sqlite3_last_insert_rowid`.)

## `complete(statement)`

Calls `sqlite3_complete` which tells you if the input string comprises one or more complete SQL statements.

## `setbusytimetype(milliseconds)`

Sets the busy timeout. (This calls `sqlite3_busy_timeout`.)

## `setbusyhandler(callable)`

Sets the busy handler to `callable`. `callable` will be called with one integer argument which is the number of times the database is busy.

## `interrupt()`

Causes any pending operations on the database to abort at the earliest opportunity. (This calls `sqlite3_interrupt`.)

## `createscalarfunction(name, callable, numargs=-1)`

Registers a scalar function. The `callable` will be called. You can specify how many arguments the function takes.

## `createaggregatefunction(name, factorycallback, numargs=-1)`

Registers an aggregate function. (This calls `sqlite3_create_function`.) You can specify how many arguments the function takes.

\*

a context object (of any type)

\*

a step function which is called for each row. The context object will be the first parameter

\*

a final function which is called at the end. The only parameter will be the context object

### **createcollation(name, callable)**

Creates a collation with the specified name and callable. The callable will be passed two strings

### **setauthorizer(callable)**

The callable is invoked while SQL statements are being prepared. The intent is to allow applications

\*

an integer representing the operation (the constants are available on the apsw module)

\*

A string (or None) dependent on the operation

\*

Another string (or None) dependent on the operation

\*

The string name of the database (or None)

\*

Name of the innermost trigger or view doing the access (or None)

You should return `apsw.SQLITE_OK` to allow the operation or `apsw.SQLITE_DENY` or `apsw.SQLITE_I`

This calls `sqlite3_set_authorizer` which contains more detailed documentation.

### **setcommithook(callable) (SQLite 3 experimental feature)**

Sets a callable which is invoked just before a commit. It should return zero for the commit

### **setprogresshandler(callable, nsteps=20) (SQLite 3 experimental feature)**

Sets a callable which is invoked every `nsteps` SQLite instructions. The callable should ret

## **Cursor class**

The Cursor class creates and executes SQLite prepared statements.

## Cursor()

You cannot create cursors directly. They are created by calling `Connection.cursor()`.

## getconnection()

Returns the `Connection` object to which this cursor belongs.

## execute(statements, bindings=())

Executes the statements using the supplied bindings. The bindings can be supplied as a tuple.

## executemany(statements, sequenceofbindings=())

Repeatedly executes statements using each element of `sequenceofbindings` for the bindings each time.

## next()

The `Cursor` object is an iterator, and so you can use it in a `for` loop or similar situations.

## getdescription()

Returns a list describing each column in the current result set. Each item is a tuple of (column name, data type, etc.).

## setexectrace(callable)

## setrowtrace(callable)

## getexectrace()

## getrowtrace()

Sets or gets the tracers.

## Exceptions

All exception types have `apsw.Error` as a parent. The following exceptions can happen:

### ThreadingViolationError

You have used an object allocated in one thread in a different thread. All objects (`Connection`

### IncompleteExecutionError

You have tried to start a new SQL execute call before executing all the previous ones. See t

### BindingsError

There is an incorrect number of bindings when using tuples. Or you supplied a dictionary of

### ExecutionCompleteError

A statement is complete but you try to run it more anyway!

### ExecTraceAbort

The execution tracer returned `False` so execution was aborted.

The following Exception classes correspond to SQLite error codes.

## General Errors

SQLITE\_ERROR `SQLiteError`

SQLITE\_MISMATCH `MismatchError`

## Internal Errors

SQLITE\_INTERNAL `InternalError`

SQLITE\_PROTOCOL `ProtocolError`

SQLITE\_MISUSE `MisuseError`

SQLITE\_RANGE `RangeError`

## Permissions etc

SQLITE\_PERM `PermissionsError`

SQLITE\_READONLY `ReadOnlyError`

SQLITE\_CANTOPEN `CantOpenError`

SQLITE\_AUTH AuthError

Abort/Busy/etc

SQLITE\_ABORT AbortError

SQLITE\_BUSY BusyError

SQLITE\_LOCKED LockedError

SQLITE\_INTERRUPT InterruptError

SQLITE\_SCHEMA SchemaChangeError

SQLITE\_CONSTRAINT ConstraintError

Memory/Disk/etc

SQLITE\_NOMEM NoMemError

SQLITE\_IOERR IOError

SQLITE\_CORRUPT CorruptError

SQLITE\_FULL FullError

SQLITE\_TOOBIG TooBigError

SQLITE\_NOLFS NoLFSError

SQLITE\_EMPTY EmptyError

SQLITE\_FORMAT FormatError

SQLITE\_NOTADB NotADBError

## Types

Read about SQLite 3 types. ASPW always maintains the correct type for values, and never converts them to something else. Note however that SQLite may convert types based on column affinity as described in that link. ASPW requires that all values supplied are one of the corresponding Python/SQLite types (or a subclass).

\*

None in Python is NULL in SQLite

\*

Python int or long is INTEGER in SQLite. The value represented must fit within a 64 bit si

\*

Python's float type is used for REAL in SQLite. (At the C level they are both 8 byte quantities)

\*

Python's string or unicode is used for TEXT in SQLite. (ASPW automatically uses Python's string class)

\*

Python's buffer class is used for BLOB in SQLite.

## Unicode

All SQLite strings are Unicode. The actual binary representations can be UTF8, or UTF16 in either byte order. ASPW uses the UTF8 interface to SQLite which results in the binary string representation in your database defaulting to UTF8 as well. All this is totally transparent to your Python code.

Everywhere strings are used (eg as database values, SQL statements, bindings names, user defined functions) you can use Unicode strings. You can also use the bare Python string class, and ASPW will automatically call the unicode converter if any non-ascii characters are present.

When reading values from SQLite, ASPW uses the Python string class for any pure ASCII text, else it uses the Python unicode class.

## Multi-threading and re-entrancy

ASPW lets you use SQLite in multi-threaded programs and will let other threads execute while SQLite is working. (Technically the GIL is released when `sqlite3_step` or `sqlite3_open` are running. The GIL is re-acquired while user defined functions, collations and the various hooks/handlers run.)

Note that you cannot use the same Connection object in multiple threads. You must allocate a new Connection object per thread. (This is a requirement of SQLite). A cursor object can only be used in

the same thread as it was allocated. (Also an SQLite requirement). Fortunately ASPW will check this for you and throw a `ThreadingViolationError` if you try to use objects in the wrong thread. Note that your destructors also need to run in the creation thread.

If you have multiple threads and/or multiple programs accessing the same database then there may be contention for the file. SQLite will return `SQLITE_BUSY` which will be raised as `BusyError`. You can call the `Cursor.next()` method to resume execution. Alternately you can call `Connection.setbusytimeout` to set how long SQLite will retry for or `Connection.setbusyhandler` to install your own busy handler. SQLite's locking and concurrency is described here

A cursor object can only be executing one query at a time. You cannot issue a new query from inside a trace function or from a user defined function or collation since these are called while executing a query. You can however make new cursors and use those without issue. You may want to remember the `Connection` object when you set your trace or user defined functions.

## Tracing

You can install tracers on a cursor as an easy way of seeing exactly what gets executed and what is returned. The tracers can also abort execution and cause different values to be returned. This is very useful for diagnostics and testing without having to modify your main code.

Note: You cannot issue new execute statements against the cursor your tracer was called from. If you would like to make more queries in the tracer then do them from a new cursor object.

## Execution Tracer

The execution tracer is called after an SQL statement has been prepared. (ie syntax errors will have caused an exception during preparation so you won't see them with a tracer). It is called with two arguments. The first is a string which is the SQL statement about to be executed, and the second is the bindings used for that statement (and can be `None`). If the return value evaluates to `False/None` then execution is aborted with an `ExecTraceAbort` exception. See the example above.

## Row Tracer

The row tracer is called before each row is returned. The arguments are the items about to be returned. Whatever you return from the tracer is what is actually returned. If you return `None` then the whole row is skipped. See the example above.

## Execution model

This section only matters if you give multiple SQL statements in one go to `cursor.execute()`. (Statements are separated by semi-colons.)

SQLite does execution in two steps. First a statement is prepared, which verifies the syntax, tables and fields and converts the statement into an internal representation. The prepared statement is then run. Execution stops when a row is available, there is an error or the statement is complete.

The `cursor.execute()` method automatically does the preparing and starts execution. If none of the statements return rows then execution will go to the end. If a row is returned then you need to call `cursor.next()` to get the row values. Execution will resume as necessary to satisfy `next()` calls.

However this means that if you don't read the rows returned then the rest of your statements won't be executed. APSW will detect unexecuted previous statements and generate an exception. For example:

```
>>> cursor.execute("select * from foo ; create table bar(x,y,z)")
```

```
>>> cursor.execute("create table bam(x,y,z)")
```

```
Traceback (most recent call last):
```

```
File "<stdin>", line 1, in ?
```

```
apsw.IncompleteExecutionError: Error: there are still remaining sql statements to execute
```

Because I didn't read the results of `select * from foo` then the following `create table` command didn't have a chance to get executed. On the next `execute` that condition is detected and an exception raised.

## DBAPI notes

DBAPI is defined in PEP 249. This section describes how APSW complies or differs from it.

## Module Interface

There is no connect method. Use the Connection constructor instead, which only takes one parameter - the name of the database.

The Connection object and any cursors must all be used in the same thread they were allocated from. You cannot use them in different threads even if you protect them with mutexes.

Three different paramstyles are supported. You can use qmark ('... WHERE name=?'), numeric ('... WHERE name=?4') and named ('... WHERE name=:name'). Note that SQLite numbers parameters from one not zero.

The DBAPI exceptions are not used.

## Connection Objects

There is no close method

There are no commit or rollback methods. You should use cursor.execute("COMMIT") etc. The SQLite documentation has more details.

Several methods that are defined in DBAPI to be on the cursor are instead on the Connection object, since this is where SQLite actually stores the information. Doing operations in any other cursor attached to the same Connection object does update their values, and this makes you aware of that.

## Cursor Objects

Use getdescription() instead of description. This information is only obtained on request.

There is no rowcount.

callproc is not implemented as SQLite doesn't support stored procedures.

There is no close method.

`execute` returns the `Cursor` object and you can use it as an iterator to get the results (if any).

`executemany` returns the `Cursor` object and you can use it as an iterator to get the results (if any).

`fetchone` is not available. Use the cursor as an iterator, or call `next()` which raises `StopIteration` when there are no more results.

`fetchmany` is not available. Call `next()` for however many results you want.

`fetchall` is not available. Call `next()` or use a list comprehension such as `[row for row in cursor.execute("....")]`.

`nextset` is not applicable or implemented.

`arraysize` is not available as `fetchmany` isn't.

Neither `setinputsizes` or `setoutputsize` are applicable or implemented.

Type objects

None of the date or time methods are available since SQLite 3 does not have a native date or time type.

Use the standard Python buffer class for BLOBs.

Optional DB API Extensions

`rownumber` is not available.

Exception classes are not available as attributes of `Connection`.

Use `Cursor.getconnection()` to get the associated `Connection` object.

scroll and messages are not available.

The Cursor object supports the iterator protocol and this is the only way of getting information back.

To get the last inserted row id, call `Connection.last_insert_rowid()`. That stores the id from the last insert on any Cursor associated with the the Connection. You can also add `select last_insert_rowid()` to the end of your execute statements.

There is no errorhandler attribute.

### pysqlite differences

pysqlite already provides a DBAPI compliant wrapper over SQLite 2 and 3. APSW only wraps SQLite 3 has the following enhancements/differences over pysqlite 3:

\*

- ♦ Nothing\* happens behind your back (such as pysqlite trying to manage transactions for you)

\*

Blobs are supported - the standard Python buffer class is used. (pysqlite 2 appears to sup

\*

SQLite's Manifest typing is used, which limits values to being supplied as integer (32/64

\*

Strings are handled correctly (pysqlite has some issues with Unicode strings).

\*

apsw ensures that precision is maintained for integers. This means that 64 bit integers do

\*

A threading safety check is used - an exception happens if an sqlite object is used in a t

\*

While SQLite is executing the Python Global Interpreter Lock is released so other threads

\*

SQLITE\_BUSY is handled well. Although it is returned as an exception, you can call cursor.

\*

You can use semi-colons at the end of commands and you can have multiple commands in the e

\*

The cursor object is an iterator and returns itself from execute.

\*

No information is fetched that wasn't requested (eg there is no 'description' field that i

\*

You can have bindings supplied as a sequence type (tuple/list etc) for replacing ? in sql

\*

You can have bindings supplied as a dictionary type.

\*

cursor.executemany() also works with statements that return data such as selects, and you

\*

You can set the busy timeout by calling Connection.setbusytimeout with the amount of time

\*

You can define your own SQL functions in Python.

\*

You can define your own collations in Python.

\*

You can implement tracers, authorizers and various hooks in Python.

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## Version History

## 1. 2.2-r1

You can use this release against any release of SQLite 3.

SQLite 3.2.2 API removed `sqlite3_global_recover`. That function was not wrapped in APSW. Note that SQLite 3.2.2 contains a bug fix that applies when you use 64 bit integer primary keys (32 bit ints are fine).

## 1. 2.1-r1

You can use this release against any release of SQLite 3.

- ♦ There are no changes in APSW except to correct an error in the example code (collations are registered against the connection not the cursor)

SQLite 3.2.1 had one addition in the stable C API, which was a new function named `sqlite3_global_recover`. That function is not applicable for wrapping in APSW.

## 1. 1.3-r1

You can use this release against any release of SQLite 3.

- ♦ The text string returned by `apsw.Error` used to say "apsw.APSWException" and has been changed to "apsw.Error". This is purely cosmetic and helps make clear what the class is. (The old string was what the original class name was in an earlier version of the code.)
  - ♦ Added `SQLITE_ALTER_TABLE` and `SQLITE_REINDEX` constants for the authorizer function. (These constants were introduced in SQLite 3.1.3).
  - ♦ Changed various C++-isms into standard C (eg // comments and the placing of some `CHECK_THREAD` macro calls)
  - ♦ Added module level function `apswversion` which returns the version of APSW.

SQLite 3.1.3 had no changes in the stable C API other than what is mentioned above. There were some new experimental functions added which are not currently documented on the SQLite website, which are not wrapped by APSW. Please contact me if you believe they will remain in SQLite and you would like them wrapped:

- ♦ `sqlite3_sleep` An alternative function which sleeps for a specified number of milliseconds can be provided. By default SQLite just uses the standard operating system call.
- ♦ `sqlite3_expired` This function is internal to statement execution. It would apply to the implementation of `Cursor.executemany` and could in theory provide a marginal improvement in performance.
- ♦ A global variable `sqlite3_temp_directory` can be used before any databases are opened to set where temporary files are created. By default SQLite just uses the standard operating system mechanisms.

### 1. 0.8-r3

There are no functional changes. The only changes were to correct some variable names in the example code (they were cut and pasted from the test code which used different names) and to make the source zip file extract its contents into a sub-directory which is the more typical way of packaging that sort of thing.

### 1. 0.8-r2

All remaining functionality in the C API for SQLite 3.0.8 is now available.

Finished this documentation.

### 1. 0.8-r1

Initial release

Last modified: Thu Jul 07 21:47:50 Pacific Standard Time 2005

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### **fpconst**

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Aaron Robert Watters

Department of Computer and Information Sciences

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University Heights

Newark, NJ 07102

phone (201)596-2666

fax (201)596-5777

home phone (908)545-3367

email: aaron@vienna.njit.edu

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## lxml

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### libxml

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## log4py

log4py

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pcre

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## THE BASIC LIBRARY FUNCTIONS

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Written by: Philip Hazel

Email local part: ph10

Email domain: cam.ac.uk

University of Cambridge Computing Service,

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End

## **pyopenssl**

**pyopenssl**

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## **pysqlite**

**pysqlite**

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## **python**

**python**

### **A. HISTORY OF THE SOFTWARE**

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Python was created in the early 1990s by Guido van Rossum at Stichting

Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands

as a successor of a language called ABC. Guido remains Python's

principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for

National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>)

in Reston, Virginia where he released several versions of the

software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see <http://www.zope.com>). In 2001, the Python Software Foundation (PSF, see <http://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived	Year	Owner	GPL-
	from			compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes

1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes

2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4.1	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes

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(1) GPL-compatible doesn't mean that we're distributing Python under

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,

because its license has a choice of law clause. According to

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Thanks to the many outside volunteers who have worked under Guido's

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schema/trex.py

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test/domapi/ (and test/test\_pyxmldom.py)

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**sqlite**

Link directly to sqlite website for the license:

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Allen Short

Andrew Bennetts

Benjamin Bruheim

Bob Ippolito

Christopher Armstrong

Donovan Preston

Itamar Shtull-Trauring

James Knight

Jason A. Mobarak

Jonathan Lange

Jonathan D. Simms

Jp Calderone

J?rgen Hermann

Kevin Turner

Mary Gardiner

Matthew Lefkowitz

Massachusetts Institute of Technology

Moshe Zadka

Paul Swartz

Pavel Pergamenshchik

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## **xmlwrapp 0.5.0**

xmlwrapp 0.5.0

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## **zope**

zope

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## **zlib**

zlib

### ZLIB DATA COMPRESSION LIBRARY

zlib 1.2.3 is a general purpose data compression library. All the code is thread safe. The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://www.ietf.org/rfc/rfc1950.txt> (zlib format), [rfc1951.txt](http://www.ietf.org/rfc/rfc1951.txt) (deflate format) and [rfc1952.txt](http://www.ietf.org/rfc/rfc1952.txt) (gzip format). These documents are also available in other formats from <ftp://ftp.uu.net/graphics/png/documents/zlib/zdoc-index.html>

All functions of the compression library are documented in the file `zlib.h` (volunteer to write man pages welcome, contact [zlib@gzip.org](mailto:zlib@gzip.org)). A usage example of the library is given in the file `example.c` which also tests that the library is working correctly. Another example is given in the file `minigzip.c`. The compression library itself is composed of all source files except `example.c` and `minigzip.c`.

To compile all files and run the test program, follow the instructions given at the top of `Makefile`. In short "make test; make install" should work for most machines. For Unix: `./configure; make test; make install`. For MSDOS, use one of the special makefiles such as `Makefile.msc`. For VMS, use `make_vms.com`.

Questions about zlib should be sent to [zlib@gzip.org](mailto:zlib@gzip.org), or to Gilles Vollant [info@winimage.com](mailto:info@winimage.com) for the Windows DLL version. The zlib home page is <http://www.zlib.org> or <http://www.gzip.org/zlib/> Before reporting a problem, please check this site to verify that you have the latest version of zlib; otherwise get the latest version and check whether the problem still exists or not.

PLEASE read the zlib FAQ [http://www.gzip.org/zlib/zlib\\_faq.html](http://www.gzip.org/zlib/zlib_faq.html) before asking for help.

Mark Nelson [markn@ieee.org](mailto:markn@ieee.org) wrote an article about zlib for the Jan. 1997 issue of Dr. Dobb's Journal; a copy of the article is available in

<http://dogma.net/markn/articles/zlibtool/zlibtool.htm>

The changes made in version 1.2.3 are documented in the file `ChangeLog`.

Unsupported third party contributions are provided in directory "contrib".

A Java implementation of zlib is available in the Java Development Kit

<http://java.sun.com/j2se/1.4.2/docs/api/java/util/zip/package-summary.html>

See the zlib home page <http://www.zlib.org> for details.

A Perl interface to zlib written by Paul Marquess <[pmqs@cpan.org](mailto:pmqs@cpan.org)> is in the CPAN (Comprehensive Perl Archive Network) sites

<http://www.cpan.org/modules/by-module/Compress/>

A Python interface to zlib written by A.M. Kuchling <[amk@amk.ca](mailto:amk@amk.ca)> is available in Python 1.5 and later versions, see

<http://www.python.org/doc/lib/module-zlib.html>

A zlib binding for TCL written by Andreas Kupries <[a.kupries@westend.com](mailto:a.kupries@westend.com)> is available at [http://www.oche.de/~akupries/soft/trf/trf\\_zip.html](http://www.oche.de/~akupries/soft/trf/trf_zip.html)

An experimental package to read and write files in .zip format, written on top of zlib by Gilles Vollant <[info@winimage.com](mailto:info@winimage.com)>, is available in the contrib/minizip directory of zlib.

Notes for some targets:

- For Windows DLL versions, please see [win32/DLL\\_FAQ.txt](#)
- For 64-bit Irix, deflate.c must be compiled without any optimization. With -O, one libpng test fails. The test works in 32 bit mode (with the -n32 compiler flag). The compiler bug has been reported to SGI.
- zlib doesn't work with gcc 2.6.3 on a DEC 3000/300LX under OSF/1 2.1 it works when compiled with cc.
- On Digital Unix 4.0D (formely OSF/1) on AlphaServer, the cc option -std1 is necessary to get gzprintf working correctly. This is done by configure.
- zlib doesn't work on HP-UX 9.05 with some versions of /bin/cc. It works with other compilers. Use "make test" to check your compiler.
- gzdopen is not supported on RISCOS, BEOS and by some Mac compilers.
- For PalmOs, see <http://palmzlib.sourceforge.net/>
- When building a shared, i.e. dynamic library on Mac OS X, the library must be installed before testing (do "make install" before "make test"), since the library location is specified in the library.

Acknowledgments:

The deflate format used by zlib was defined by Phil Katz. The deflate and zlib specifications were written by L. Peter Deutsch. Thanks to all the people who reported problems and suggested various

improvements in zlib; they are too numerous to cite here.

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Jean-loup Gailly

Mark Adler

jloup@gzip.org

madler@alumni.caltech.edu

If you use the zlib library in a product, we would appreciate *not* receiving lengthy legal documents to sign. The sources are provided for free but without warranty of any kind. The library has been entirely written by Jean-loup Gailly and Mark Adler; it does not include third-party code.

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