Splunk Release Notes

Version: 3.3.1

Generated: 11/22/2009 03:46 am
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What's New

What's in the Release Notes?

What's in the Release Notes?

Come here to learn about What's New in the latest version of Splunk, what the Known Issues are, and check the Changelogs to see what problems we've resolved lately.

Find what you need

You can use the table of contents to the left of this panel, or simply search for what you want in the search box in the upper right.

If you're interested in more specific scenarios and best practices, you can visit the Splunk Community Wiki to see how other users Splunk IT.

What's new in Splunk 3.3

What's new in Splunk 3.3

Summary Indexing

Splunk's new summary indexing features solves many common problems associated with running aggregate reports over long periods of time. Before summary indexing, Splunk had to access your entire data set for each report. For example, to generate a daily report of access statistics over the last 30 days, Splunk had to access the data for the 30 days every day. In this particular example, summary indexing eliminates this redundancy and overhead by automatically running a search every day that stores the result for that day in a summary index. Then, you run your report for the last 30 days using the much smaller and more focused dataset to generate overall statistics. Summary indexing decreases the impact of running the report on your system and increases the speed significantly. If you must keep your data for long periods of time for the purposes of running summary reports, use summary indexing to aggregate results and discard the original events, saving you space.

For more information, refer to the documentation for summary indexing.

Application browser and manager

The Splunk Application Manager allows authorized users to install and upgrade Splunk Applications directly from Splunk Web. Authorized users are able to view and manage their installed Splunk Applications at a glance, significantly improving usability of an extended Splunk deployment. Users can also browse and install applications available on SplunkBase from within Splunk Web.

For more information, refer to the documentation for the application manager.

Continuous crawling

Splunk continuously crawls your IT infrastructure and notifies or adds new data sources based on configurable settings. You can also preview what new data sources would look like inside Splunk before adding them to your index. Preview is fully integrated into Crawl to ensure you only index the new data sources you're interested in.

Beyond black/whitelisting: Crawl and its ability to automatically identify and configure new data sources combined with the expressiveness of the Splunk search language offer great new capability to ensure that all IT data gets indexed regardless of when your Splunk deployment is configured, without the tedium and constant review required by blacklisting and whitelisting specific files and directories.

For more information, refer to the documentation for crawl.

Windows Registry input

Baseline, track and audit Windows Registry changes using Splunk's new Registry tracking feature. You can choose to collect the entire Registry, filter by hive, or just track changes. By adding Registry data to your Splunk index, you can now track installations, configuration changes, and address complex application failures on Windows directly from a single console.

For more information, refer to the Windows Registry input documentation.

WMI input

Splunk can now tap directly into one of the most important Windows management data sources: Windows Management Instrumentation, or WMI. WMI provides Splunk with performance and system health information, as well as method for polling servers remotely for data (such as Event Logs). WMI inputs expand your options for scaling your data collection.

For more information, refer to the WMI input documentation.

New directory structure and nomenclature for custom bundles/applications

Starting with version 3.3, Splunk's custom bundle directory structure and terminology have both changed. Bundles are now referred to as applications. The existing directory structure and nomenclature are supported in version 3.3, but will be deprecated in a future release. Splunk

provides a script for migrating your existing bundles directories to the new structure. Refer to these instructions for more information on how to migrate your applications.

For detailed information about the new applications directory structure, refer to the documentation about configuration files.

New developer tools

Splunk 3.3 ships with a complete REST API. SDKs providing wrappers for Splunk's REST endpoints are available in several different languages. For information on the new REST API (with links to the SDKs), refer to the Developer Manual.

Python SDK

Splunk's Python SDK allows for simpler application creation with one of the world's easiest-to-use object-oriented programming languages.

.NET SDK

Splunk's .NET SDK allows for simpler application creation with the widely-used Microsoft .NET development framework.

Known Issues

Known Issues for release 3.3.1

Known Issues for release 3.3.1

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.
- Unable to disable Splunk Applications from top header control in UI. To enable/disable an Application from UI, use the enable/disable link in the row.
- 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, version 3.2 and earlier will only work with other deployed servers of exactly the same version, but 3.3.x will work with 3.2.x and 3.3.x.
- 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, contact 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)
- 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 enabling LDAP authentication, saved searches running as the `admin` user no longer function. To work around this, change the user the search runs as to a different user. (SPL-13870)
- Decreasing the number of events shown in the GUI (by editing the number of cards and decks) to a low number causes the GUI to keep reloading. (SPL-14267)
- Intermediary CAs are not yet supported in SSL certificates. (SPL-14463)
- LDAP authentication does not work when LDAP has no groups. (SPL-14439)
- Server-class CLI commands fail authentication. (SPL-14059)
- Wildcards in File system change monitor stanzas are ignored. (SPL-14487)
- You cannot turn off File change monitor using `disabled=true`. You must delete the stanza for the changes to take work. (SPL-15017)
- In the web UI, you cannot filter searches on fields extracted by the REX command (SPL-15699), or based on 'eventtype::foobar' in $SPLUNK_HOME/etc/system/local/props.conf (SPL-15700)
- File System Change Monitor stops monitoring subsequent files/directories when it encounters special character devices. Workaround is to blacklist to skip these special character devices (SPL-16098)

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.
- 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. (SPL-12313)
- You must use two backslashes `\\` to escape wildcards in stanza names in `inputs.conf`. (SPL-7270)
- 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 been tested on English versions of the operating system only. Foreign language versions are unsupported.
- Changing the service login credentials of `splunkd` after installation is not supported. (SPL-14631)
- Regular expressions do not currently work in the Registry baselining feature. (SPL-14743)
- Registry Monitoring is not currently supported on Windows 2000 due to an issue with a Windows 2000 dll, PSAPI.DLL. (SPL-16000).
- There is an issue with stopping and restarting Splunk currently affecting users of remote WMI polling. If one or more of your WMI sources is unavailable at the time that you stop Splunk, Splunk will not come back up unless you wait for the `splunk-wmi.exe` process to exit, or kill

it manually. To avoid this issue, do not unnecessarily list non-existent/non-functioning machines in `wmi.conf`. (SPL-16612)

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 starting with version 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 ouput, 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)
- Transaction search may not display all matching lines in Splunk Web (SPL-13151)
- The date is not extracted from log filenames if the source type is not a single line source type. (SPL-12594)
- You cannot search for data from an index that has a space in the name. The UI allows one to be created, but it cannot be searched. (SPL-15698)

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 can mix 3.3.x with 3.2.x, but mixing 3.1.x and 3.2.x nodes in a distributed search cluster is not supported. 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

- Due to a change in Firefox 3, enabling SSL for a Splunk deployment may result in an "invalid security exception" being displayed in the browser. Refer to this workaround documentation for more information.
- Splunk 3.2 and later 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. 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)
- 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)

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.
- Having fschange monitor the same thing in two different application with differing settings causes conflicts which results in those differences being ignored (SPL-15680)

Splunk Toolbar considerations and issues

- The Splunk Toolbar sometimes incorrectly displays two drop-down arrows in the search box. This is 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.

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 'SplunkCerverDefaultCert' 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+

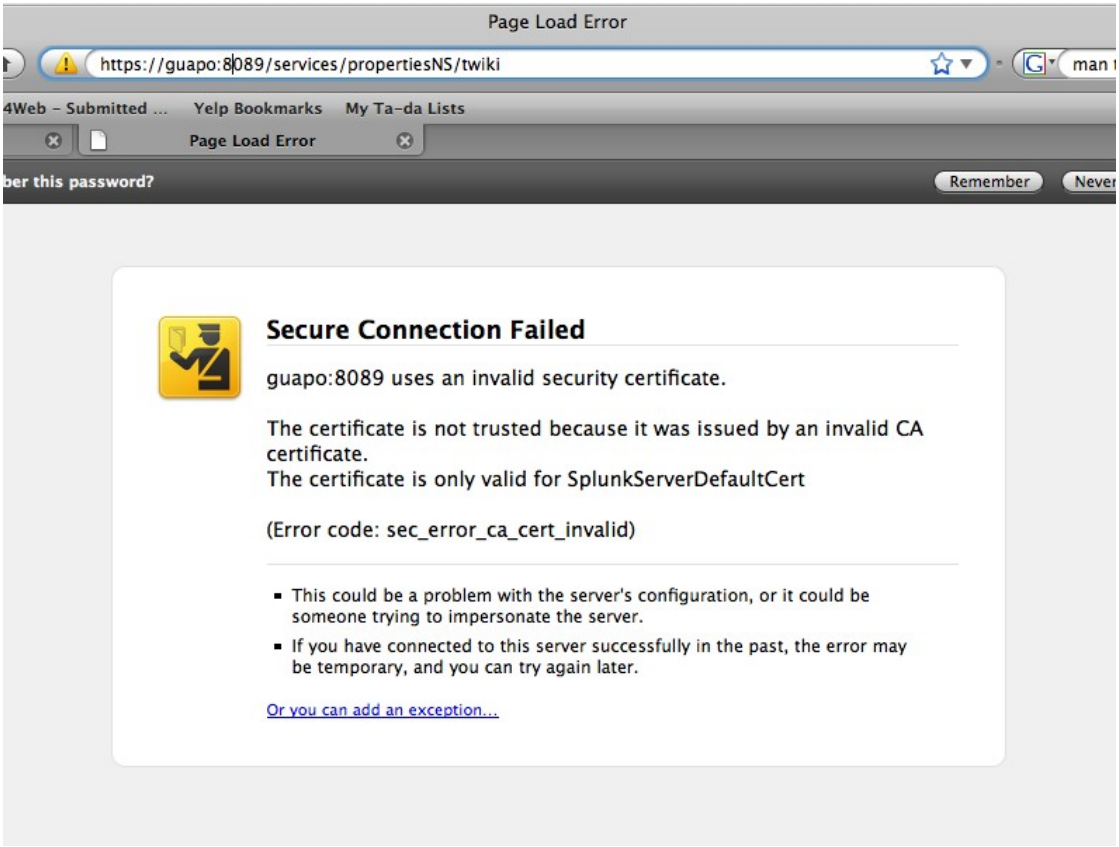
3. `splunkweb` is set in web.conf to have `enableSplunkWebSSL=true`

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

3.3

3.3

The following issues have been resolved in version 3.3

- The free version of Splunk no longer returns an auth error when attempting to access REST endpoints. (SPL-13741)
- Spool input now consumes different files with the same name. (SPL-14536)
- `indexes.conf` is now deployable. (SPL-14480)
- `Break_before_date` in `props.conf` is now functional. (SPL-14363)
- All file types now show the correct timestamp in Splunk Web. (SPL-14347)
- Custom timerange now resets correctly when starting a new search. (SPL-14142)
- Subsearches that return 0 results are no longer ignored in the search pipeline. (SPL-14006)
- The User role can now search distributed search instance without `allow_livetail` capability enabled. (SPL-13828)
- LDAP user DN to group member entry mapping is no longer case sensitive. (SPL-13752)
- Event type attribute values are no longer case-sensitive. (SPL-13577)
- Eventtypes with complex phrasing are now searchable and reportable. (SPL-11340)
- Auto tImestamp extraction now recognizes AM & PM in event data. (SPL-13736)
- The `filter` option in the file system change monitor now works on Windows. (SPL-13610)
- The deployment server now restarts Splunk Web. (SPL-13281)
- The send email script no longer sends 2 emails. (SPL-6892)
- The search `idxprobe` now looks into `colddb`. (SPL-14124)
- Metrics now have a tunable parameter for the number of results in sample period. (SPL-14090)
- Splunk now auto-extracts fields for `| idxprobe tsidx`. (SPL-14062)
- Pie charts now show values. (SPL-13755)
- You can now specify `-format csv` if specifying `-header false` when searching. (SPL-13392)
- The source for UDP inputs is now set correctly. (SPL-13739)
- On Windows and AIX, Splunk was using an out of date Olsen database to determine proper timezone offsets. This database has been updated. (SPL-14347)
- If you are using IE6, you will no longer see 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.` (SPL-13331)
- Issues with assigning multiple graph types to a saved search have been resolved. (SPL-9893)
- Dashboard loading issues arising from a security fix in the 3.2.3 release of Splunk have been resolved. (SPL-13639, SPL-13656)
- Windows only: Splunk now picks up new and changed files correctly without needing to restart. (SPL-14281)
- Windows only: Typeahead now correctly escapes '\' in Windows file-path. (SPL-14095)
- Windows only: `coldToFrozenScript = echo $DIR` in `indexes.conf` now functions correctly. (SPL-14008)

- Windows Event Logs are input correctly when "Run Splunk" is unchecked at the end of the installation. (SPL-14121)
- Regexes with backslashes in them are now supported when specifying paths to files. (SPL-12679)

3.3.1

3.3.1

The following issues have been resolved in this release of Splunk.

- The Power user role now allows use of Live Tail. (SPL-15337)
- Configuration files deployed by the Deployment server to `/usr/local` now properly take precedence over other configuration files. (SPL-15204)
- Permissions for directories created by the Linux .rpm installation are now set correctly. (SPL-15198)
- Correct time is now displayed on AIX systems when not using Daylight Savings Time. (SPL-15114)
- An issue with data crossover between indexes when using the summary indexing feature has been resolved. (SPL-14936)
- Splunk now logs all successful login attempts rather than just the first one. All logout and login failure continue to be logged correctly. (SPL-14960)
- The User role can no longer add schedules to existing saved searches. (SPL-14867)
- Piping a search to timechart and sorting results according to tag value now works correctly. (SPL-14850)
- Debian package installation now completes correctly. (SPL-14934)
- The Back button now functions correctly when viewing reports. (SPL-14283, SPL-10705)
- Splunk no longer crashes if you fail to specify a valid value for `groupNameAttribute` (= cn) in `authentication.conf` when configuring an LDAP server. (SPL-13562)
- An issue with columns not being sorted correctly when you have only one row of results has been resolved. (SPL-14810)
- Distributed search now functions correctly across indexes. (SPL-14807)
- Splunk's LDAP integration now correctly handles spaces in a dn definition. (SPL-14718)
- XML output for REST endpoint queries against search results now displays full set of results. (SPL-14701)
- The file system change monitor feature now displays file permissions in octal rather than hex. (SPL-14352)
- Round-robin forwarding configuration now functions correctly when one of the Splunk servers stops and restarts. (SPL-13673)
- The `$SPLUNK_HOME/share/splunk/search_oxiclean/rss` directory permissions on install have been corrected so RSS feeds can be created. (SPL-10695)

Windows-specific issues

- Multiple issues with migration from earlier versions of Splunk for Windows have been resolved. (SPL-14906)

- An issue with display of dashboards on reload of main Splunk Web page has been resolved. (SPL-15027)
- Changing the user Splunk runs as now works. (SPL-14871)
- Saving a search using the drop-down menu now correctly saves the alert properties for the alert. (SPL-14753)
- Splunk Alerts now support .bat scripts. (SPL-15012)
- The Message field is now extracted correctly in Windows Event Logs. (SPL-15064, SPL-15063)
- The ComputerName field is now displayed correctly for all Windows Event Logs. (SPL-15056)
- The SourceName is now extracted correctly for Windows Event Logs. (SPL-15055)
- Custom values for host set in `inputs.conf` are no longer overwritten by localhost. (SPL-14997)
- Custom values of index set in `indexes.conf` are now honored. (SPL-14996)

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 numbe

###

### bindings - dictionary
```

```
###

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

###

### 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 otherwi

    return 0  # returning non-zero aborts

# register progresshandler every 20 instructions

connection.setprogresshandler(progresshandler, 20)

# see it in action

print "spinny 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) ; com
```

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 com
```

```
$ 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 assertion

                                                 # improve performance (about 25%) at the e

$ 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_libversio
```

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 sqli
```

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_

complete(statement)

Calls sqlite3_complete which tells you if the input string comprises one or more complete SQ

setbusytimeout(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 i

interrupt()

Causes any pending operations on the database to abort at the earliest opportunity. (This ca

createscalarfunction(name, callable, numargs=-1)

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

createaggregatefunction(name, factorycallback, numargs=-1)

Registers an aggregate function. (This calls sqlite3_create_function.) You can specify how m

*

  a context object (of any type)

*

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

*

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

createcollation(name, callable)

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

setauthorizer(callable)

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

*

  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 inststructions. The callable should ret
```

Cursor class

The Cursor class creates and executes SQLite prepared statements.

Cursor()

```
You cannot create cursors directly. The 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 eac
```

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 (co
```

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 (Connecti
```

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 SQLError

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 quant

*

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

*

  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 mulitple 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 seperated 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 Interpretter 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

boost

boost

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fpconst

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```
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Aaron Robert Watters

Department of Computer and Information Sciences

New Jersey Institute of Technology

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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OpenSSL

OpenSSL

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pcre

pcre

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THE BASIC LIBRARY FUNCTIONS

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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Version 2.1, February 1999

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 We call this license the "Lesser" General Public License because it
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making modifications to it. For a library, complete source code means

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interface definition files, plus the scripts used to control

compilation

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b) You must cause the files modified to carry prominent notices

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d) If a facility in the modified Library refers to a function or a

table of data to be supplied by an application program that uses

the facility, other than as an argument passed when the facility

is invoked, then you must make a good faith effort to ensure that,

in the event an application does not supply such function or

table, the facility still operates, and performs whatever part of

its purpose remains meaningful.

(For example, a function in a library to compute square roots has

```
   a purpose that is entirely well-defined independent of the

   application.  Therefore, Subsection 2d requires that any

   application-supplied function or table used by this function must

   be optional: if the application does not supply it, the square

   root function must still compute square roots.)
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This option is useful when you wish to copy part of the code of

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4. You may copy and distribute the Library (or a portion or

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must be distributed under the terms of Sections 1 and 2 above on a

medium customarily used for software interchange.

If distribution of object code is made by offering access to copy

from a designated place, then offering equivalent access to copy the

source code from the same place satisfies the requirement to

distribute the source code, even though third parties are not

compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the

Library, but is designed to work with the Library by being compiled or

linked with it, is called a "work that uses the Library". Such a

work, in isolation, is not a derivative work of the Library, and

therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library

creates an executable that is a derivative of the Library (because it

contains portions of the Library), rather than a "work that uses the

library". The executable is therefore covered by this License.

Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file

that is part of the Library, the object code for the work may be a

derivative work of the Library even though the source code is not.

Whether this is true is especially significant if the work can be

linked without the Library, or if the work is itself a library. The

threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data

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functions (ten lines or less in length), then the use of the object

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Otherwise, if the work is a derivative of the Library, you may

distribute the object code for the work under the terms of Section 6.

Any executables containing that work also fall under Section 6,

whether or not they are linked directly with the Library itself.

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6. As an exception to the Sections above, you may also combine or

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 For an executable, the required form of the "work that uses the
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```
   <one line to give the library's name and a brief idea of what it
```

does.>

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library `Frob' (a library for tweaking knobs) written by James
```

Random Hacker.

```
<signature of Ty Coon>, 1 April 1990
```

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Ty Coon, President of Vice
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That's all there is to it!

pysqlite

pysqlite

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python

python

A. HISTORY OF THE SOFTWARE

==========

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 from	Year	Owner	GPL-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
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Thanks to the many outside volunteers who have worked under Guido's

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zope

zope

ZPL 2.1

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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 (deflate format) and 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). 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>, or to Gilles Vollant <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 before asking for help.

Mark Nelson <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> 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> 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> is available at 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>, 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.

If you redistribute modified sources, we would appreciate that you include in the file ChangeLog history information documenting your changes. Please read the FAQ for more information on the distribution of modified source versions.