

Apama 10.11.3.3 Readme

June 2022

This file contains important information you must read before using Apama 10.11.3.3. You can find system requirements, user documentation, and installation and upgrade instructions on the [Documentation website](#) or the [Tech Community website](#). At those locations, you can also find suite-related security and globalization information.

Included in this file is information about functionality that has been added, removed, deprecated, or changed for this product. Deprecated functionality continues to work and is supported by Software AG, but may be removed in a future release. Software AG recommends against using deprecated functionality in new projects.

1.0	Critical Information.....	2
2.0	Known Issues.....	2
3.0	Usage Notes.....	3
4.0	Fixes Included in Each Release.....	8
5.0	Other Resolved Issues.....	9
6.0	Documentation Changes	48
7.0	Terminology Changes	49
8.0	Added, Removed, Deprecated, or Changed Items.....	49
9.0	Added, Removed, Deprecated, or Changed Built-In Services.....	49
10.0	Added, Removed, Deprecated, or Changed Parameters.....	49
11.0	Added, Removed, Deprecated, or Changed APIs	49
12.0	Copyright Information.....	50
13.0	Support.....	50

1.0 Critical Information

This section lists any critical issues for the current release that were known when this readme was published. For critical information found later, go to the Knowledge Center on the [Empower website](#).

Important: The Software AG Update Manager allows you to individually select which fix packages you wish to install. However, to ensure that all dependencies between the Apama fix packages are met, it is essential that you always select, and thus install, all Apama fix packages - do not try to install fixes for a subset of the Apama components you have installed.

For installation information, see *Installing Apama* in the downloaded package (accessible via the index.html file which is in the doc/apama-onlinehelp directory of your Apama installation directory) or on the [Documentation website](#).

2.0 Known Issues

This section lists any issues for the current release that were known when this readme was published. For known issues found later, go to the Knowledge Center on the [Empower website](#).

Designer

- PAM-31465
Launching Software AG Designer can significantly slow down and freeze on Windows 10 if Windows Defender is enabled. The workaround for this issue is to add the SoftwareAG\Designer directory to the exclusion list for Windows Defender. Steps for adding to the exclusion list can be found in https://bugs.eclipse.org/bugs/show_bug.cgi?id=548443#c28.

3.0 Usage Notes

This section provides any additional information you need to work with the current release of this product.

ADBC

- PAM-21466

Bundled Oracle JDBC driver can incorrectly report Oracle Advanced Security errors (since 5.2.0.0). Even when Oracle Advanced Security is not turned on for the server, the following error can occur during connect:

```
[Oracle JDBC Driver]The connect attempt failed because the server
requires Oracle Advanced Security. To enable the driver to use OAS,
please use the "dataIntegrityLevel" and/or "encryptionLevel" connect
options.
```

To work around the issue, set the connection URL option `randomNumberGenerationOptions` to one of the following values:

“1” - The driver uses secure random numbers for handshake. The driver generates secure random numbers before the start of handshake, thus preventing this issue to occur due to the amount of time the connection needs to be made.

“2” - The driver uses random numbers instead of secure random numbers for handshake. This is less secure but provides a faster connection to occur.

DataDirect recommends setting this to the value of “1” and then re-testing. If the issue still occurs, then try the value of “2”.

- PAM-23063

Occasional connection errors with some JDBC drivers. It is not recommended to use multiple correlators against a single IAF, as the message IDs might not be unique and therefore could result in failures.

- PAM-10573

Some supported databases store empty strings as NULL (since 5.3.0.0).

Some databases such as Oracle are known to store empty strings as NULL values, which can lead to confusion when executing queries where a field is compared to the empty string. For example, the following would not match rows where the field was null for such databases:

```
select * from table where field = ""
```

To ensure the desired results are returned when running queries against databases that store empty strings as null, we recommend queries to be written to check for NULL instead of empty string literals.

- PAM-3876
Support for NaN in Apama ADBC adapter (since 5.0).
Support for storing and retrieving a NaN value is not supported with all databases. The following databases have been tested:
 - MS SQL Server and MySQL - No support. Database does not support NaN values.
 - Oracle - Full support for JDBC.

Adapters

- PAM-30527
The Apama Cumulocity IoT transport implementation has changed some of the internal channel names (since 10.5.0).
This will be transparent to most users, but if you are trying to debug or test code by subscribing a receiver to those channels, you may need to subscribe to the `CumulocityIoTGeneric` channel instead of, or in addition to, the `CumulocityIoT` channel. In addition, if you are connecting to a tenant which does not have automatic hostname mapping (such as with a Cumulocity IoT Edge instance) you may need to explicitly set the `CUMULOCITY_TENANT` option in your configuration properties.
- PAM-15644
Unicode variable names in mapping rules cannot be resolved (since 5.0).
Mapping in the correlator-integrated messaging adapter for JMS does not support internationalization for variable names. That is, only English characters are allowed in complex mapping template variable names.

Software AG Designer

- PAM-21618
Pre-existing JDBC/ODBC projects do not start after Ant export (since 5.3.0.0).
Existing JDBC adapter projects (5.2 and older) will require manual updating when used with Apama 5.3 and older to address a problem with Ant Export project referencing incorrect location for the adapters folder. To perform this update, you need to follow the steps below:
 - In the Project Explorer, right-click the project and select **Properties**.
 - Navigate to **Apama > MonitorScript Build Path** and select the **Bundles** tab.
 - Select the **JDBC Adapter:\ADBC-JDBC.bnd [Adapter catalog]** node.
 - Click the **Update** button.
 - A **Bundle instance** warning box will be shown to ask you for whether to back up existing files.
 - Choose **Yes**.
 - Your instance file should be updated to address this Ant Export issue.

- PAM-21378
Creating duplicate launch configuration does not honor previous launch values (since 5.2.0.0). Duplicating the Apama launch configuration whose mode is set as “shared” will not duplicate the deploy configuration. When the “Duplicate” action of the launch configuration dialog is invoked on selecting an Apama launch configuration which is in “shared mode”, an error dialog appears, saying that deploy configuration does not exist and it then reverts to the default settings. To complete the duplication of the launch, go to the folder where the launch configuration exists and copy the contents of its deploy file at the same location and name as launch. Paste the contents to the new deploy file (which shares the name of the new launch configuration) and save the file. This extra manual step will complete the “Duplicate” action.

Correlator

- PAM-21747
Apama queries do not appropriately map line numbers when reporting exceptions (since 5.3.0.0). While compile-time errors are reported with the correct line number for Apama queries, runtime exceptions are not. If a runtime exception is thrown, then the stack trace of the exception (whether uncaught and reported by the correlator, or inspected by a catch statement in EPL) will show some details of the queries runtime system, and the line numbers will not correspond to lines in the query source file.

Dashboards

- PAM-21512
Dashboard client is showing exception in log when dashboard server is stopped (since 5.2.0.0). The following error message will be logged to the dashboard client log file(s) when shutting down the connected dashboard server process(es):

```
ERROR [GmsClientReceiverThread-<host>:<port>] - error receiving message:
java.net.SocketException: Connection reset
error receiving message:
java.net.SocketException: Connection reset (<host>:<port>)
```

This message merely indicates the disconnection between the dashboard components and the server. Despite being logged as ERROR, these messages are informational only.
- PAM-12975
Panels deployments can save header when disconnected from webserver (since 4.3). If panels.ini is used for display server dashboard, then an invalid HTTP session (for example, re-start Tomcat) will result in a sessionExpired page inside the main frame of the dashboard. Clicking on the login link on that page to re-login will *not* clear the previously displaying tabs/trees. Refresh the web browser or re-visit the dashboard URL to fix the problem.

- PAM-12699

Filters containing quotes are broken when running with enhanced query mode (since 4.3). Attachments where the filter value is a string containing a quote do not work in enhanced query mode. In enhanced query mode, attachment filters are turned into SQL WHERE clauses. When using enhanced query mode and having the need to filter by values containing quotes, you need to escape each quote with a quote. Double quotes do not need to be escaped.
- PAM-11994

Re-deploy of dashboard does not delete cached files (since 4.2.2). If dashboard files were removed between two display server deployments (that is, deploy foo.rtv, then delete foo.rtv from project and re-deploy), the deleted dashboard files will still be available for the re-deployed client. To work around this, delete the reference directory, *APAMA_WORK/dashboards/deployed_dashboard*, manually before re-deploying.
- PAM-11830

Improperly defined JDBC connection causes CPU spike in SQL server when using Dashboard Builder (since 4.2.2). Dashboards using the SQL datasource with invalid JDBC connection parameters can sometimes cause high CPU usage due to numerous failed JDBC connection attempts to the SQL server. This issue can occur if an invalid JDBC password is specified and the Dashboard Builder SQL option **Get Tables and Columns** is enabled.
- PAM-11716

Custom window title from Dashboard Builder options is not supported (since 4.2.2). Setting window titles in the Dashboard Builder using **Custom Window Title** in **Tools > Options > General** tab is not supported. Window titles can be set on the command line used to invoke the dashboard viewer.
- PAM-11551

Apama commands in display server with large amounts of string data may fail (since 4.2). Executing Apama commands in display server deployments with large amounts of string data may fail if the resulting HTTP GET request exceeds the maximum allowed string length.
- PAM-10722

Dashboard deployment wizard does not re-sign already signed jars (since 4.2). The dashboard deployment utility in Software AG Designer will not re-sign jar files that are already signed. If you add jar files to your dashboard deployment that are already signed, you may see errors when accessing the deployed dashboards. When using the dashboard deployment utility, you can sign all jars, or none of them (in this case, they would all need to be signed already), or (if you have a mix of signed and unsigned jars) sign with the same certificate that was used for the jars that have already been signed. If you'd like the deployment utility to sign jars that have been previously signed, you will have to first remove their signatures.

- PAM-5474

Display server dashboards clearing edited text field on update (since 3.0.2).

Input controls when displayed via the dashboard server may clear any edits when the display is updated. This makes it very difficult to use input forms with the display server. The problem occurs with input controls that are attached to either an Apama scenario, DataView, or dashboard function. When creating input forms in dashboards that will be deployed via the display server, you can follow one of the following techniques:

- Do not attach the value property of input controls to Apama scenarios, DataViews, or functions. This is fine if the current value of the attachment does not need to be displayed in the control.

- Attach the value property of input controls to variables set as the result of a drilldown. This will allow the initial value to be set to the value of the variable. The deficiency here is that if the value changes externally, it is not reflected in the control unless a new drilldown is performed.

- PAM-4405

Delete All with many instances blocks UI (since 3.0).

Using the Dashboard Builder's **Delete All** command to delete large numbers of scenario instances can make the dashboard user interface appear blocked. This is because control is not returned to the user interface until the **Delete All** operation has completed.

Other

- PAM-28499

Cannot correctly override configuration properties with UTF-8 strings in a Command Central template (since 10.2.0.0).

When using Command Central templates to configure an instance of an Apama correlator, the UTF-8 character encoding of property keys and values in the `APAMA-PROPS-OVERRIDES` configuration item will not always be honored. We do not recommend using characters in property keys and values outside of the ASCII range.

4.0 Fixes Included in Each Release

This section lists the latest fix level that has been included in each release for each product component. A release is listed in this section only if changes occurred in that release. Go to the Knowledge Center on the [Empower website](#) for detailed information about fixes.

Release 10.7

- PAM_10.7.0_Fix27

Release 10.5

- PAM_10.5.0_Fix25

Release 10.3

- PAM_10.3.0_Fix23

Release 10.1

- PAM_10.1.0_Fix20

5.0 Other Resolved Issues

This section lists the issues that were resolved in each release but were not part of the fixes listed in the previous section. A release is listed in this section only if changes occurred in that release.

Release 10.11.3.3

Software AG Designer

- PAM-33491
Cannot add predictive analytics bundle to a project.
The hyphen character was not allowed in the instance name previously. This was preventing any adapter that had a hyphen in its name from being added. This issue is now fixed by allowing a hyphen in the instance name.

Cumulocity IoT Transport

- PAM-33414
Cumulocity IoT multi-tenant integration cannot handle error responses when an HTTP 503 is received.
Cumulocity_Rest_API.mon now supports a more reliable retry mechanism to recover from errors during startup in case of multi-tenant deployment mode.

Release 10.11.3.2

Connectivity and Adapters

- PAM- 33568
Fix connectivity-unit-test-harness.jar to work with jackson-databind 2.13.1.
Customers who have created their own connectivity plug-in codec using the UnitTestHarness.java sample should remove any references to UntypedObjectDeserializer.Vanilla from that class and instead subclass the base class UntypedObjectDeserializer if needed. This is required due to some breaking changes in jackson-databind v2.13.1.

Release 10.11.3.1

Other

- PAM-33506
Apama fix to update OpenSSL to resolve CVE-2022-0778.
In Docker images, the version of OpenSSL has been updated to resolve CVE-2022-0778. Customers with access to Software AG Update Manager (SUM) should install the latest "Common Libraries for OpenSSL" fix located in the Infrastructure > Libraries section of SUM.
- PAM-33496
Vulnerable third-party spring-beans/spring-core needs to be upgraded to 5.3.18.
The version of the Cumulocity IoT SDK used by the Cumulocity IoT codec has been updated to resolve CVE-2022-22965. Customers who have access to Software AG Update Manager (SUM) should also install the latest Shared Bundles SpringFramework fix located under Shared Bundles in SUM.

Release 10.11.3

Connectivity and Adapters

- PAM-33337
Kafka Java client plug-in throws `LoginException`: unable to find `LoginModule` class.
The Kafka Java client plug-in `LoginException` "unable to find `LoginModule` class" has been fixed.
It now successfully constructs consumers and producers when `sasl.jaas.config` is provided in the `connectivity.yaml` configuration file.

Correlator

- PAM- 33416
Correlator status line generation is expensive when the number of chains or user status items is large.
The correlator log line generation used to be expensive when a lot of user status was created. Now the log line generation no longer depends on the number of user status items created.

Cumulocity IoT Transport

- PAM-33039
Upgrade Cumulocity IoT SDK to pick up Cumulocity IoT fix for vulnerable third-party component spring-web (found in Docker image).
The Cumulocity IoT client SDK has been updated to the latest version 1011.0.16 which removes CVE-2021-22118.

- PAM-33372
Cumulocity_Rest_API.mon populates incorrect `tenantId` in `TenantDetails` for per-tenant use cases.
When deployed in a per-tenant environment, the `tenantId` in the `ApplicationSubscribedForTenant` notification was incorrectly populated with the `tenantId` of the bootstrap tenant instead of the current tenant. This issue has been resolved.
- PAM-33411
Cumulocity_Rest_API.mon is not scalable with a large number of tenants.
When deployed in a multi-tenant environment, Cumulocity_Rest_API.mon used to take $O(n^2)$ space. This issue has been resolved. It now takes a linear amount of space with respect to the number of tenants.

Software AG Designer

- PAM- 33441
"Open declaration" and "Open definition" sometimes do not open at the correct file/location.
"Open Declaration" was incorrectly calculating the matching file for the action members when there were multiple files in the same package declaration. This has now been fixed and the right file and action definition are shown upon selecting the "Open Declaration" in the EPL editor for the action members.

Other

- PAM-32882
Upgrade `jdom.jar` to avoid security advisories.
The JDOM v1 library has been removed from the Apama classpath to resolve security vulnerability CVE-2021-33813. In the unlikely event you have custom Java classes which were making use of the (undocumented/unsupported) presence of the JDOM v1 API on the classpath (`org.jdom.*`), you will need to add your own copy of JDOM v1 to the classpath or change your classes to use a different library such as JDOM v2+.

Release 10.11.2.1

Connectivity and Adapters

- PAM-33337
Kafka Java client plug-in throws `LoginException`: unable to find `LoginModule` class.
The Kafka Java client plug-in `LoginException` "unable to find `LoginModule` class" has been fixed.
It now successfully constructs consumers and producers when `sasl.jaas.config` is provided in the `connectivity.yaml` configuration file.

Cumulocity IoT Transport

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`Cumulocity_Rest_API.mon` populates incorrect `tenantId` in `TenantDetails` for per-tenant use cases.
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When deployed in a multi-tenant environment, `Cumulocity_Rest_API.mon` used to take $O(n^2)$ space. This issue has been resolved. It now takes a linear amount of space with respect to the number of tenants.

Release 10.11.2

Software AG Designer

- PAM- 33104
Fix the resource leak when an event is dropped onto canvas in queries.
When an event was dropped onto the canvas in the Query Designer editor, a small resource leak occurred. This issue has been resolved.

Correlator

- PAM- 33206
State the key value for a duplicate key error for a dictionary.
When a duplicated key was detected in a dictionary, an error occurred, but the error did not show the value of the duplication. Now, the error also displays the duplicated key value. Example:
`IllegalArgumentException - Duplicate key in dictionary : 1`

Release 10.11.1.2

Other

- PAM- 33291
Vulnerable third-party component Log4j 2.16 used - upgrade to 2.17.1.
Apache Log4j has been upgraded to version 2.17.1 to resolve security vulnerabilities CVE-2021-45105 and CVE-2021-44832. In addition to installing this Apama (“PAM”) fix, to avoid these vulnerabilities, it is essential to also install the latest Shared Bundles/Shared Bundles Loggers (“TPP”) fix.

Installer

- PAM-33251
Standalone installer needs to include fixes from other products.
The standalone community installers now include published fixes for components that were previously only available using the commercial online installer.

Release 10.11.1.1

Other

- PAM- 33217
Vulnerable third-party component Log4j used.
Apache Log4j has been upgraded to version 2.16.0 to resolve security vulnerabilities CVE-2021-44228 and CVE-2021-45046. In addition to installing this Apama (“PAM”) fix, to avoid these vulnerabilities, it is essential to also install the latest Shared Bundles/Shared Bundles Loggers (“TPP”) fix.

Release 10.11.1

Connectivity and Adapters

- PAM- 33106
IBM MQ receivers cannot use `extraMappingThreads` with default `maxBatchSize` in `BEST_EFFORT` mode.
When using correlator-integrated JMS to receive from IBM MQ, extra mapping threads could not be used with `BEST_EFFORT` receivers using the default receiver `maxBatchSize` value. This issue has been resolved.

- PAM-32694
 Recreating an HTTP client generic JSON chain instance fails due to status key already existing. Previously, trying to recreate a destroyed `HttpClientGenericJson` chain with the same parameters used to throw an exception because of a duplicated status item (“Connectivity plug-ins: Exception creating user status item”). This has been fixed.
 The underlying issue of not being able to reuse `chainInstanceId` when creating a dynamic chain using `ConnectivityPlugins.createDynamicChain()` if the previous chain instance has been destroyed has also been fixed.
- PAM-32336
 Behavior of HTTP server with incomplete requests.
 The behavior of the included HTTP server has been modified to discard requests where the message content is less than the defined `Content-Length`, to bring it more in line with the HTTP/1.1 specification. This does not currently include `Content-Encoded` requests, such as gzipped requests.
 The behavior of the included HTTP server has been modified to discard the `Content-Length` header when the `Transfer-Encoding` header is also set, to bring it more in line with the HTTP/1.1 specification.

Release 10.11.0.1

Correlator

- PAM-33035
 Wrong XPath results in Apama 10.7.
 Correlator-integrated JMS could produce wrong XPath results when XPath expressions were used in both conditional expressions and mapping rules. This issue has been resolved.

Dashboards

- PAM-33065
 Dashboard Builder is missing `PALETTE_flat.ini` after SL 7.3 upgrade.
 A new Object Palette Style, Flat, has been added in Dashboard Builder 10.11. But this mode has missing Trends and Trends HTML5 tabs in Object Palette. This issue has been resolved.

Release 10.11.0

Correlator

- PAM-31411
Correlator `cpuProfiler` leaks.
A minor leak when using the CPU profiler with transient or deleted monitors has been fixed.
- PAM-32768
Deadlock in storage plug-in when mixing `Table.get()` and `RequestInstances`.
A rare deadlock in the `MemoryStore EPL` plug-in with a full queue has been fixed. This issue has so far only been seen in internal testing. A thread waiting on a full queue holding a read lock and another thread waiting on a write lock caused the two threads to become deadlocked.

Connectivity and Adapters

- PAM-32775
Cumulocity codec: Remove `delivery` fragment from operation while sending an update request. Previously, EPL using the Cumulocity IoT transport to receive an `Operation` and then pass it back to the platform with some modifications would fail. Specifically, code like this

```
on all Operation(status="PENDING") as op {  
    ...  
    send op to Operation.SEND_CHANNEL;  
}
```

would fail, with an error in the Apama logs like:

```
{error:undefined/validationError,message:Following fields are not  
updateable: delivery,info:https://www.cumulocity.com/guides/reference-  
guide/#error\_reporting}
```

This has now been resolved.

Other

- PAM-32200
Apama Command Prompt should allow users to use their own `SSL_CERT_FILE`.
The `apama_env` script overwrote `SSL_CERT_FILE` in the environment. Users were unable to provide their own CA bundle to the Apama Command Prompt as `SSL_CERT_FILE` was overwritten with the default file shipped with Apama within the `apama_env` script. This issue is now resolved. The user can now set `SSL_CERT_FILE` in the environment and it will not be overwritten by `apama_env`.

Release 10.7.2.1

Connectivity and Adapters

- PAM-32469
Vulnerable third-party Velocity component used.
The Apache Velocity third-party library used by correlator JMS has been upgraded to version 2.3 to improve security.

Cumulocity IoT Transport

- PAM-32955
Incorrect mapping of `c8y_Position` and child references when `ManagedObject.withChannelResponse` is used.
Top-level fields in `ManagedObject` events like `position`, `childDeviceIds`, `childAssetIds`, `deviceParentIds` and `assetParentIds` were not populated correctly when the `ManagedObject.withChannelResponse` API was used. This is resolved now.
- PAM-32939
SMS is not getting generated by “on alarm” smart rule.
SMS addresses with a protocol identifier specified as “tel” were incorrectly rejected by the Apama connectivity integration. This is resolved now.

Apama in Cumulocity IoT

- PAM-32877
Listener on `Cumulocity IoT Error` events does not receive events on error.
A fix has been made where an `Error` event is now received in the case of network failures or timeouts while connecting to Cumulocity IoT. For `Find` request types, an acknowledgement is now also received in such cases.

Release 10.7.2

Cumulocity IoT Transport

- PAM-32554
Breaking change in `GenericResponse` behavior should be configurable to old behavior. 10.7.0 introduced a breaking change in the contents of the `com.apama.cumulocity.GenericResponse.body` member. This fix introduces a mechanism to revert to the old behavior. This can be done by setting a property in the correlator on startup: `analyticsBuilder.genericResponse.body=payload`. This may be needed for compatibility with applications running in a Streaming Analytics application in Cumulocity IoT.

APIs

- PAM-32033
`C++ StatusReporter::StatusItem` needs to be fully thread-safe.
`C++ StatusReporter::StatusItem` is fully thread-safe now.

Correlator

- PAM-32485
`deleteAll` does not actually remove coverage information.
A change in 10.7.1 retained coverage information for transient/deleted files, except on `deleteAll`. A bug caused it to also be retained on `deleteAll`, but this has now been fixed.
- PAM-32417
LLVM includes n^2 copies of the clang version in `.comment` sections.
Applications running the compiled runtime on Linux can experience high memory usage and long compilation times. When using a compilation cache, then they can also experience very large cache directories. This happens with complex EPL applications with very deep dependency graphs between EPL types. Redundant object file information has been removed, improving the size of cache directories, injection times and memory usage for the compiled runtime.
- PAM-31031
Rework correlator receiver/sender connect/disconnection log messages (including slow receiver).
The messages logged by the correlator when receivers are connected, disconnected or become slow now have more information about the receiver.

Connectivity and Adapters

- PAM-32455
Shutting down a chain containing a queue should not lose events that are on the queue.
If the Batch Accumulator codec has any messages queued to send towards the host, it waits to flush them before shutting down. This is not true if the host itself is shutting down (rather than just the chain).

- PAM-32451
`Chain::isStartThread threadlocal` should be a static to avoid hitting `PTHREAD_KEYS_MAX` limit.
 Prior to this fix, each connectivity chain requested its own thread-local key for chain management purposes. When a large number of chains is created (for example, more than 1000), the maximum number of thread-local keys in the system may be reached, with consequential effects on other functionality in the system wishing to use thread-local memory. On Linux, a call to `pthread_key_create()` would return `EAGAIN`. On Windows, a call to `TLSAlloc()` would return `TLS_OUT_OF_INDEXES`. The fix ensures that only one thread-local key is requested for the management of all connectivity chains.
- PAM-32345
 Crash in HTTP concurrent chains on ARM.
 On ARMv7 platforms using the HTTP server connectivity plug-in configured for concurrent chains, the correlator dumped core when those chains were started. This is now resolved.
- PAM-32484
 DistMemStore/JMS Spring tries to connect to remote URL to find schema.
 The Spring resolver used to attempt to look up XML schema URLs via the network. This has now been disabled.

Release 10.7.1.3

Cumulocity IoT Transport

- PAM-32563
 Undo breaking change to `GenericResponse.body` behavior.
 In 10.7.0 we introduced a breaking change to `GenericResponse.body` to remove an erroneous single-element dictionary in which the actual body had been wrapped. This caused an unacceptable level of inconvenience to our cloud customers since this change had not been warned in advance. Accordingly, we have reverted the change in the 10.7.1.3 fix. If you rely on this new behavior, you can restore it in one of two fashions:
 - Call the new `GenericResponse.getBody()` method we added in this fix which will always return the new, unadorned, body.
 - Set the property `analyticsBuilder.genericResponse.body=payload.body` which will change `GenericResponse.body` to the new behavior.

Correlator

- PAM-32562
 Correlator shutdown crash during management flush all queues.
 In a previous fix, code was introduced which caused a rare shutdown crash on Windows platforms when shutting down a correlator connectivity plug-in. The change which caused the occasional crash has now been reverted to avoid the occasional crash.

Release 10.7.1.2

Cumulocity IoT Transport

- PAM-32554
Breaking change in `GenericResponse` behavior should be configurable to old behavior. 10.7.0 introduced a breaking change in the contents of the `com.apama.cumulocity.GenericResponse.body` member. This fix introduces a mechanism to revert to the old behavior. This can be done by setting a property in the correlator on startup: `analyticsBuilder.genericResponse.body=payload`. This may be needed for compatibility with applications running in a Streaming Analytics application in Cumulocity IoT.

Connectivity and Adapters

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`Chain::isStartThread` threadlocal should be a static to avoid hitting `PTHREAD_KEYS_MAX` limit.
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Crash in HTTP concurrent chains on ARM.
On ARMv7 platforms using the HTTP server connectivity plug-in configured for concurrent chains, the correlator dumped core when those chains were started. This is now resolved.

Correlator

- PAM-32485
`deleteAll` does not actually remove coverage information.
A change in 10.7.1 retained coverage information for transient/deleted files, except on `deleteAll`. A bug caused it to also be retained on `deleteAll`, but this has now been fixed.

- PAM-32417
LLVM includes n^2 copies of the clang version in `.comment` sections.
Applications running the compiled runtime on Linux can experience high memory usage and long compilation times. When using a compilation cache, then they can also experience very large cache directories. This happens with complex EPL applications with very deep dependency graphs between EPL types. Redundant object file information has been removed, improving the size of cache directories, injection times and memory usage for the compiled runtime.

Release 10.7.1.1

Connectivity and Adapters

- PAM-32344
HTTP server with `concurrentChains: true` unnecessarily waits for chains to be destroyed before processing next request.
A change was made to correct a locking situation where if `concurrentChains` is on in a HTTP server chain and if the queue became full, it could have blocked further HTTP server requests being processed.

Release 10.7.1

Correlator

- PAM-32297
Correlator crashes when `libnss_ldap` is configured on system for SSL.
There is a known issue with running Apama on systems configured to use `libnss_ldap` in-process. This applies to any system authentication method using SSL which does not use an external daemon. This is due to the custom OpenSSL shipped with Apama. The work around is either to disable SSL for your LDAP requests or, preferably, configure the system with an external authentication provider such as `SSSD` or `nslcd`, rather than `libnss_ldap` directly.
- PAM-31918
Sending in large (8Mb) managed object uses disproportionately large amounts of memory (> 1Gb). The ordering of entries in containers within EPL and within connectivity plug-ins is undefined in some cases. A change in this release to reduce memory usage had the side effect of changing some of this ordering. This is particularly likely to be reflected in the order of entries in maps when printed by some connectivity plug-ins like the diagnostic codec or the JSON format produced by the JSON plug-in. It could also affect the order that map entries are iterated over in your own plug-ins.
- PAM-32155
EPL on `completed InnerEvent()` crashes the correlator.
A correlator crash has been fixed. The crash occurred when a monitor was deleted which contained both an event type defined within its scope (an “internal event”) and an `on completed` listener for such events.

- PAM-32070
Correlator should allow starting during grace period after license expiry.
The correlator now starts with an expired license in its grace period, that is, 7 days post expiration date.
- PAM-32036
Incorrect type for runtime object of `any.getGenericAction()`.
Calling `getGenericAction` on an `any` value that is an action, a value of type `action<sequence<any> >` returns `any` is returned. However, after assigning the return to an `any`, a call to `getTypeName()` would return the original action's type which would match the original signature, not `action<sequence<any> >` returns `any`, for example, would be a type mismatch. The correct type is now returned by `getTypeName()`.
- PAM-32000
`GenericComponentManagementAdapter::getHostname` deallocates its return value.
An issue leading to corrupted data in the Prometheus hostname metric has been fixed.
- PAM-31960
Combination of big events and channel prefixes can cause a crash in `engine_send`, correlator (`EventStreamReader`).
Parsing an event (.evt) file with single lines in excess of 256kB combined with lines using a channel name before the event could result in a crash. This issue is resolved.
- PAM-31887
Correlator crash handler should log EPL monitor name etc. if possible.
In case of a correlator crash, after the correlator stacktrace, the EPL stacktrace is now printed as well.
- PAM-31932
New soft-reserved keywords have been added to the Event Processing Language (EPL). The `await` keyword is now a soft-reserved keyword. This may become a language feature in the future, so it is recommended to avoid using it to avoid confusion.

Management Tools

- PAM-31996
`httpserver_passman` silently fails if `httpasswd` is not writeable.
`httpserver_passman` used to silently ignore if the `httpasswd` is not writable. Now it throws an error, stating a permission issue.

Cumulocity IoT Transport

- PAM-32088
senderAddress and senderName are required fields for sending SMS messages to Cumulocity IoT.
When the HTTP client generic JSON bundle is added to the project configuration, defaults for the sender name and sender address are now retrieved from the tenant options in Cumulocity IoT if they are not specified in the SendSMS event. If the tenant options cannot be retrieved from Cumulocity IoT, you can now configure the defaults by adding CUMULOCITY_SMS_SENDER_NAME and CUMULOCITY_SMS_SENDER_ADDRESS to the .properties configuration file of the Cumulocity IoT transport.
- PAM-31998
Cumulocity IoT ObjectCommitted/ObjectCommitFailed responses are sent on the default channel.
It is now possible to receive responses for the creation or update of predefined types (Measurement, ManagedObject, Alarm, Event, MeasurementFragment, and Operation) on their respective SUBSCRIBE_CHANNEL.
- PAM-31593
Generic requests should correctly support DELETE request where the body is empty.
On a Cumulocity IoT GenericRequest, a GenericResponseComplete acknowledgement is now sent even when the content-type is not set.

EPL Plug-ins

- PAM-32139
HTTP client: Query value incorrectly converted to ISO-8859-1.
The HTTP client and HTTP server connectivity transport plug-ins are no longer converting UTF-8 characters to ISO8859-1 for query string and path.

Dashboards

- PAM-31260
APAMA_DASHBOARD_CLASSPATH is not honored from environment when launching from Software AG Designer.
The APAMA_DASHBOARD_CLASSPATH environment variable can now be used when launching dashboards from Software AG Designer, thereby matching the behavior when opening dashboards from the command line.

Software AG Designer

- PAM-31672
NPE while adding JNDI environment property using JMS Configuration Wizard.
An error could occur when attempting to add a connection property to a Universal Messaging Correlator JMS Adapter as part of the configuration wizard. This issue has been resolved.

- PAM-31092
Data player not removing ADBCStatusManager.mon when launching project with xclock and timestamps from data.
The data player reliably removes ADBCStatusManager.mon now if it is externally clocked.

Connectivity and Adapters

- PAM-32221
Mapper codec fails to find item in map.
Incorrect comparison of `map_t::iterators` in C++ connectivity plug-ins is now detected. If it occurs, an exception “Invalid comparison of iterators into different maps” will be thrown. The correct course of action is to identify the source of the bug and fix it. For operational purposes, the exception may be suppressed by the existence of the environment variable `AP_SKIP_DATA_T_ITERATOR_CHECKS`.
- PAM-31928
JMS BEST_EFFORT queue receiving with IBM MQ is painfully slow.
For customers using JMS to receive non-persistent messages from an IBM MQ queue, a change was made (the default receiver `maxBatchSize` is now 1, that is, `AUTO_ACK` not `CLIENT_ACK`) which can enable significant performance improvements if you also add the `?READAHEADALLOWED=YES` MQ property to the queue URL (see the IBM documentation for further information about the read-ahead allowed option). This change does not affect other JMS vendors, does not affect topics, and does not affect persistent (reliable) messages.

Release 10.7.0

Cumulocity IoT Transport

- PAM-31248
CumulocityCodec should reject requests if datetime is not mentioned in epoch.
When making queries to Cumulocity IoT, timestamp fields (`fromDate`, `toDate`, `fromCreationDate`, `toCreationDate`) are required to be seconds since the epoch (as a float or a string). Previously, non-parsing strings would return all historical artifacts. Now they are rejected with an error.

APIs

- PAM-31437
Java `engine_client` library can get into state where inject will always fail, but this cannot be detected easily.
Sender-only disconnects in the Java engine client interface were in some cases not being correctly reconnected in the `ping()` method. This has now been fixed.

Connectivity and Adapters

- PAM-31432
Universal Messaging client should drop messages which exceed `nSession::getMaxBufferSize()`.
An exception is thrown if a Universal Messaging client sends an input buffer whose size exceeds the server's buffer size (default value 20 MB), where before it would have failed and retried forever.
- PAM-31661
JSON codec crashed when messages in `towardsHost` and `towardsTransport` arrived at the same time.
In a connectivity chain, there is a possibility that 2 threads try to use the JSON codec at the same time. This used to result in a correlator crash. This is now fixed.
- PAM-29847
Upgrade Saxon parser used for JMS XPath.
The Saxon parser library has been updated from 8.9 to 9.9.1.

Correlator

- PAM-31452
Vulnerable third-party `sqlite3.dll` component used.
The version of SQLite used with Apama has been updated to address the following security advisories: CVE-2019-19646, CVE-2020-11656 and CVE-2020-11655. None of these were directly exploitable within the Apama platform.
- PAM-31427
Correlator core dump if debug logging (but not EPL coverage) is enabled when injecting Analytics Builder EPL code.
A crash during injection has been fixed. The crash occurred with both application event logging and optimizations enabled when passing constants to static actions from another static action.
- PAM-31430
`any.hasEntry(k)` returned true for strings, primitives, for all `k`.
Calling `hasEntry` on an `any` containing a string now returns false for all entries other than "value". This now matches both the documentation and the behavior of `getEntry`, which will throw on any entry other than "value".
- PAM-31687
Object pool should use optimal allocator for all sizes if the allocator is `jemalloc`.
Some memory improvements when using the `jemalloc` allocator have been made.
- PAM-31416
Undocumented correlator parameter `--qsize` changed the logged "Output queue size" but had no other effect.
The `--qsize` option to the correlator has been removed. This was previously undocumented and had no effect.

- PAM-31803
Update jemalloc to v5.2.1 and also ship the unprefixed version of jemalloc libraries that users can load dynamically using `LD_PRELOAD`.
The version of jemalloc shipped with the installation has now been upgraded to 5.2.1.
- PAM-31513
Management plug-in's async jobs not flushed in `flushAllQueues`.
Using `flushAllQueues` from the Management plug-in, which is the underlying implementation for the Management interface, did not wait for the `asyncRequests` to complete.
The Management plug-in supports executing `asyncRequests`, and the `flushAllQueues` request did not wait for these. This issue is now resolved. `flushAllQueues` will wait for `asyncRequests` to complete, with the exception of requests executing from the Management interface (as that would deadlock).

Release 10.5.3.3

Cumulocity IoT Transport

- PAM-31374
Cumulocity codec discards multiple messages if one has an error.
Instead of dropping the entire batch, only the messages causing exceptions will now be dropped.

Correlator

- PAM-31729
Prometheus endpoint generates invalid values.
The Prometheus endpoint sometimes reported bad values and duplicates. This issue has now been fixed.

Release 10.5.3.2

Software AG Designer

- PAM-31448
Vulnerable third-party SnakeYAML component used.
SnakeYAML has been upgraded to address CVE-2017-18640.
- PAM-31559
Project initialization list fails to be generated from Designer.
Exporting an Apama project initialization list to a text file from Designer is now fixed.

APIs

- PAM-31456
Vulnerable third-party log4net component used - only affects customers using our .NET client API.
Apache log4net has been upgraded to address CVE-2018-1285.

Cumulocity IoT Transport

- PAM-31647
Generic request `content-type` preserved in request not reconstituted.
Using a Cumulocity IoT `GenericRequest` event to send JSON data to Cumulocity IoT is no longer sensitive to the case used when specifying the `content-type` in the header.
- PAM-31579
Requests created via `CumulocityRequestInterface.createRequest()` do not include application key (if available).
The `X-Cumulocity-Application-Key` header is now included in requests from Apama to Cumulocity IoT using the `CumulocityRequestInterface`, which means that the `deviceRequestCount` will not include Apama requests.

Correlator

- PAM-31679
Crash in Python plug-ins parsing from `any`.
A Python plug-in method that takes a parameter of the `any` type can crash the correlator when invoked with a parameter containing a value that is a dictionary type or an event type. This has now been fixed, along with a second crash at shutdown in certain situations when using a Python plug-in.

Connectivity and Adapters

- PAM-31566
Generic JSON chain does not honor user-supplied content type.
A regression was introduced in 10.5.3.0 where explicitly overridden `content-type` headers using the generic HTTP client could have a `charset` appended to them. This has now been fixed.
- PAM-31444
Vulnerable third-party CXF component used.
Apache Camel has been updated to 3.3.0 and Apache CXF has been updated to 3.3.6 to resolve vulnerabilities associated with the previous versions. Since this is a major update of these components, users with extensive use of the web services adapter may experience some differences in functionality.

Release 10.5.3.1

Cumulocity IoT Transport

- PAM-31483
Does `deviceRequestCount` include the request from Apama (by setting `X-Cumulocity-Application-Key` header)?
The `X-Cumulocity-Application-Key` header is now included in requests from Apama to Cumulocity IoT, which means that the `deviceRequestCount` will include Apama requests.
- PAM-31514
Cumulocity IoT transport does not log all unexpected HTTP errors.
The Cumulocity IoT transport was only logging some errors from the Cumulocity IoT platform. It missed out certain kinds of error that would be useful in diagnosing misconfiguration, such as authorization errors and missing microservices. This has now been fixed.

Connectivity and Adapters

- PAM-31379
Vulnerable third-party camel-core component used.
Apache Camel has been upgraded in order to fix CVE-2018-8027.

Release 10.5.3

Software AG Designer

- PAM-30787
Incorrect `engine_deploy` dependencies generated when project is directly under a drive root path.
On Windows platforms, generating an injection order list for any Apama project from a root directory by specifying the relative path of the project was not honoring exclude or include patterns specified in the project. This issue is now fixed.

APIs

- PAM-31331
C++ chain managers do not compile without using namespace.
C++ chain managers no longer require a “using namespace” in order to compile.

Cumulocity IoT Transport

- PAM-31304
Cumulocity codec hitting map iterator modification assert.
In some cases, the `CumulocityCodec` component that is used for sending requests to Cumulocity IoT from Apama could fail to send either part or all of a request or response. This has been corrected.

Correlator

- PAM-31407
switch (any as value) crashes the correlator on injection.
When writing incorrect EPL of the following form, Software AG Designer silently allowed this error, and the correlator crashed when attempting to inject this incorrect EPL.

```
switch(<name of type> as value) {  
    ...  
}
```

This has now been fixed in both cases.

- PAM-31037
Java connectivity plug-in framework should call `Thread.setContextClassLoader`.
Connectivity plug-ins and EPL plug-ins written in Java will now have the context class loader set to be the correct class loader for the plug-in when invoked.
- PAM-30745
Correlator can dump core in `InitInjectThread::logStatus` during shutdown.
A rare crash during shutdown of correlators using YAML injection lists has been fixed.

Connectivity and Adapters

- PAM-31352
HTTP client is unable to send requests in some non-English locales.
HTTP client connections could fail when running on Windows configured in a locale with a timezone name containing non-ASCII characters. This issue has been fixed.

Documentation

- PAM-31256
ApamaDoc in generated documentation contains errors.
Documentation has been corrected for some trigonometric functions in the built-in `float` and `decimal` types.

Release 10.5.2.1

Connectivity and Adapters

- PAM-31304
Cumulocity codec hits map iterator modification assert.
In some cases, the CumulocityCodec component that is used for sending requests to Cumulocity IoT from Apama failed to send either part or all of a request or response. This has been corrected.

Release 10.5.2

EPL Plug-ins

- PAM-31179
Occasional core dumps are seen in the upgraded Storage plug-in to the new API.
A rare race-to-crash when opening MemoryStore tables on multiple threads simultaneously in a persistent correlator has been fixed.
- PAM-31115
Codecs with background threads sending events can crash other codecs.
It was previously possible for a connectivity plug-in which started a background thread to send events to another plug-in whose `start()` method had not yet completed, which violates the API contract of connectivity plug-ins. Now such sends will block until the chain has completed `start()` on all plug-ins. Sending from the `start()` method itself is not permitted for the same reason, but blocking would deadlock, so it prints a warning message instead.

Connectivity and Adapters

- PAM-31108
Infinite loop in HTTP client and HTTP server connectivity plug-ins.
If the HTTP server connectivity plug-in was sent a request with a gzip or deflate content-encoding header set but the body not actually compressed, then the HTTP server would never send a response to the client. This would exhibit a “chain is slow” warning in the correlator log. The HTTP server connectivity plug-in now safely handles this scenario and responds with status code 400 (Bad Request).

Cumulocity IoT Transport

- PAM-31238
Position attributes of Cumulocity Managed Objects cannot parse stringified lat/long.
The Cumulocity IoT transport now accepts strings that can be converted to numbers in a position, whereas previously these would have been excluded from the position dictionary on `ManagedObject`.
- PAM-31235
CumulocityCodec causes a correlator crash when retrieving lots of pages.
Fetching too many pages from Cumulocity IoT used to crash the correlator due to stack overflow. It is now fixed.

Correlator

- PAM-31170
Correlator not able to handle long paths on Windows.
The correlator has been enhanced to support loading EPL monitor files via the YAML configuration file with paths that are longer than `MAX_PATH` on Windows.

- PAM-31143
Correlator deadlocks if some EPL is runnable while other EPL causes a timeout of a stop-the-world-request.
In some circumstances, a correlator request which needs to suspend contexts (such as `toStringAll`) but which timed out due to a long-running monitor execution could leave other contexts suspended after it times out, leading to other operations deadlocking. This issue has now been fixed.
- PAM-31126
Concurrent, first request to Prometheus endpoint caused a correlator crash.
Concurrent accesses to the `/metrics` endpoint on the correlator could result in a crash, and also when new `/metrics` statistics were first reported, they held the value zero (first access only). The risk of crashing is now removed, and the current value, of any new statistics, will be retrieved when accessed for the first time.
- PAM-31106
First Prometheus metrics request returns `...memory_bytes 0.000`.
Access to new `/metrics` statistics would report the value zero (first access only). The current value, of any new statistics, will now be retrieved when accessed for the first time.

Other

- PAM-30846
`pip3` tries to execute Python from `apama-lib-src` (and does not work in Designer).
The `pip` command in the Python interpreter shipped with Apama was previously not functioning on Windows when executed directly, rather than as a Python module. This also caused `pip` not to be able to run through `pydev` in the Software AG Designer environment. The default `pip` executable has been replaced with a shell wrapper to fix this issue, which is available on the `PATH` in your Apama command prompt.

Release 10.5.1

Connectivity and Adapters

- PAM-29458
Multi-threaded performance scaling of JMS XPath mapping is very poor.
The previous bottleneck affecting JMS scalability on multicore platforms has now been addressed. JMS now makes better use of cores and delivers greater performance.

Cumulocity IoT Transport

- PAM-30999
Runtime error when activating model in Analytics Builder which should be more robust in handling “atypical” objects.
A runtime error was seen in Analytics Builder when a model failed to activate in one of the subtenants. This issue is now resolved.

- PAM-31014
Cumulocity chain should log a WARN message if measurement timestamp is not set or invalid. It is possible to forget setting a timestamp when sending measurements, alarms or events. If the timestamp is unset or is during the year 1970, a warning message is logged once per managed object.
- PAM-31036
Cumulocity IoT transport cannot use credentials from environment for long polling. Previously, the old Cumulocity IoT transport required a user name and password to be specified in a configuration file. Now, it can pick up configurations from the environment. This is especially useful in the microservice mode where the user does not need to populate the configuration file and an empty configuration file can be injected. In the case of an app-key, a lookup for the application using its name is performed. If the lookup fails, then the app-key must be provided in the configuration file.

ADBC

- PAM-29763
IAF allows commands to be executed before fully up in ADBC. To conform with best practice, the ADBCHelper has been updated to ensure the adapter is up before it can proceed with any next operations, in both startup and reconnection scenarios.

Correlator

- PAM-27043
Correlator and IAF should print logfile to stdout on startup. If the correlator or the IAF is configured to log to a file, then the log file being used will be output to stderr. In the case of the correlator, this is the full path and filename whereas the IAF will only log the filename.

Other

- PAM-30176
VisualizingDataInADashboard EPL generates huge number of DataView updates. The Persisting Data and Visualizing Data samples would use up an ever increasing amount of memory and if left running for a long period of time, the process would shut down. This issue is now resolved.

Release 10.5.0

Software AG Designer

- PAM-30809
apama_project tool fails if a project contains a deleted bundle (fixed in 10.5.0.1).
The older 9.8 and 9.0 versions of the Cumulocity IoT transport and associated bundles have been removed in the 10.5 release. As a result, older projects migrated to the 10.5 version which were using these older versions of the transport, would not work with the apama_project tool until the projects had been modified to use the newer 10.5 bundles/transport. This issue is fixed by allowing the apama_project tool to be used to perform the steps necessary to remove the old bundles and add the new ones.
- WF-5508
Designer does not start after install if UAC is turned on.
Designer can now be started as a non-administrator user after installation is run as an administrator even when UAC is turned on. Installation of additional packages will still require administrator privileges.

Connectivity and Adapters

- PAM-30636
Cumulocity IoT transport fails to forward child references received as part of real-time notifications.
Linked childDevices/childAssets were not being populated for a ManagedObject received via the real-time notifications mechanism. This is fixed now.
- PAM-30313
Message List codec metadataMode=first can result in empty metadata.
The Message List codec with mode=first used to result in empty metadata when more than maxBatchSize messages pass through it. Now it will always have the metadata of the first message. Fixed an issue with mode=splitBatch which resulted in lower batching than specified in maxBatchSize. Fixed an issue with mode=splitBatch which resulted in bad batching of messages.
- PAM-30058
An empty buffer_t translates to a null in Java, should be byte[0].
An empty buffer used to get converted to null when transferred from a C++ connectivity plug-in to a Java connectivity plug-in. Now it gets converted to a byte buffer of size 0.

Correlator

- PAM-30828
Performance issue in any type - calling `loadAllConstants` too much (fixed in 10.5.0.1).
Performance has been improved in EPL reflection using any objects, particularly the `hasAction` and `getAction` calls.
- PAM-30880
Engine connect YAML flips meaning of `mode=legacy/parallel` (fixed in 10.5.0.1).
An issue has been fixed where specifying the correlator connect mode in the YAML file interpreted `legacy` as `parallel` and vice versa.
- PAM-30594
Overwriting a valid license file with another valid license file can sometimes kill the correlator (rare race).
When updating the Apama license file for the correlator it was possible to exit due to an invalid license file, even when the file was valid. This issue has been fixed.
- PAM-30565
Prometheus metrics printed with locale-specific number formatting with Java enabled.
In some locales, it was possible for the Prometheus integration to return invalid numeric data. This issue has been resolved.
- PAM-30025
Re-reading and updating license files does not work correctly.
It was possible to replace the Apama license file and the correlator failed to update to the new license details. This has now been fixed.
- PAM-30018
`Platform::generateUniqueId()` is not unique in Docker containers with `--network host`.
When running multiple "engine_" tools from Docker containers with `--network host` started at the same time, the tools could get disconnected. This has been fixed by adding additional checks for generating unique physical IDs on Linux.
- PAM-30017
`dictionary.remove` never decreases the size of the dictionary object.
EPL dictionary objects which were very large and then shrunk via the `dictionary.remove` method could still use a lot of memory. The `dictionary.remove` method has been changed so that it can shrink the underlying data structure when it is much larger than now necessary.

Dashboards

- PAM-30860
Apama query `Extra` params not showing the expected values (fixed in 10.5.0.1).
When making an attachment to an `Extra Param` table and a query is used as the basis, an incorrect table was displayed showing the query fields and not the key and value columns. This has been fixed.

- PAM-30844
Unable to see OHLC data with `dataview` (fixed in 10.5.0.1).
When making an attachment to OHLC data in a dashboard, an incorrect table would be displayed showing the `dataview` fields and not the “Open”, “High”, “Low”, “Close” fields. This has been fixed.

Installer

- PAM-30845
Windows `apama_env` path should include `python\Scripts` (fixed in 10.5.0.1)
On Windows, the Python utility executables (such as `pip`) are not in the same directory as the main Python executable. So they were not available by default on the path in an Apama Command Prompt. The `Scripts` directory has been added to the path on Windows so that `pip` can now be used without further qualification.

Release 10.3.1.5

EPL Plug-ins

- PAM-30242
Warnings of thread leaks and functional problems when running against LLVM using `TCStore`.
Using Apama `MemoryStore` with Terracotta 10.x could produce thread leak warnings at shutdown. This issue has been addressed, but does slightly increase injection times with LLVM enabled. The increase in injection time is proportional to the total memory used by the correlator, so is worse in very large correlators.

Connectivity and Adapters

- PAM-30544
Cumulocity IoT connectivity plug-in should be configurable with a tenant ID and a URL.
Previously, it was required of Cumulocity IoT transport users to configure the tenant in the connectivity plug-in YAML file. Now, the tenant is an optional configuration parameter and the transport will operate based on whether the URL or tenant option is specified.
- PAM-30311
Add `gzip` encoding support to HTTP client.
The HTTP client transport can encode HTTP requests with `gzip` or `deflate` compression format. Users can set `metadata.http.headers.content-encoding` to indicate which compression format they want to compress the HTTP requests.
- PAM-29863
Apama Docker images contain invalid DES license.
Docker images used to contain an expired Digital Event Services license. This has been fixed and now a license will last for 30 days from when the container was created.

Cumulocity IoT Transport

- PAM-30514
Attempt to update objects in Cumulocity fails if `creationTime` and `lastUpdated` are present. The Cumulocity IoT transport fails to update a managed object/event/operation that contains `creationTime` or `lastUpdated` in the `params` dictionary. This is because Cumulocity IoT does not accept these fields while making a REST request. This is fixed now.
- PAM-30400
Missing timestamps of `ManagedObject` within `com.apama.cumulocity`. Timestamps fields such as `creationTime` and `lastUpdated` were missing from the `com.apama.cumulocity.ManagedObject` object when using the query interface (`requestAllDevice=true` or `FindManagedObject`) to retrieve managed objects from Cumulocity IoT. `creationTime` and `lastUpdated` are now added to the `params` dictionary of the `ManagedObject` event.
- PAM-30265
`SocketTimeout` if sending a response after 10 minutes of nothing. The Cumulocity IoT transport fails to send a message to Cumulocity IoT in scenarios where the transport is idle (that is, no messages are being sent from the transport to Cumulocity IoT) for a long duration (more than 10 minutes). This is fixed now.

Correlator

- PAM-30359
GC after running spawned-to actions. In earlier releases, spawned actions which immediately free monitor variables but do not receive events soon afterwards may go a long time without being garbage-collected. Spawned actions are now always immediately garbage-collected to guard against this.

Release 10.3.1.1

Software AG Designer

- PAM-30252
The `apama_project` tool creates non-portable projects with hardcoded local path. The newly introduced `apama_project` tool was found to be creating projects containing absolute paths, which could not then be successfully used or deployed on another machine. This issue has now been resolved, and `apama_project` correctly creates new projects in the same portable format used by Software AG Designer.

Release 10.3.1

Connectivity and Adapters

- PAM-29743
Using the URL `terracotta:<port-number>` to connect to Teracotta fails to connect .
When configuring a connection to TerracottaDB where the host name (as described in the `storeName` configuration) is simply “terracotta”, the store would fail at the preparation stage in EPL. This has now been fixed.
- PAM-29549
A connectivity chain returning events into the correlator can deadlock if the input log is enabled. Occasionally, the correlator would deadlock when the input log was in use and all of the following were true:
 - A listener in the main context is sending events to a connectivity chain.
 - The transport is synchronously sending events back into the main context.
 - The output queue for the chain and the input queue is full.
 - An external sender is attached, sending events into the main context.This issue has now been fixed.

ADBC

- PAM-29477
ADBCHelper API - Queries retried when they shouldn't and not retried when they should.
The following ADBCHelper reconnect options have been marked as deprecated: `RECONNECT` and `RECONNECT_AND_CLEAR_REQUEST_QUEUE`.
Please continue to use `RECONNECT_AND_RETRY_LAST_REQUEST` or `DO_NOT_RECONNECT`.
The behavior of the reconnect policy options in the ADBCHelper API was incorrect in some situations and now behaves correctly to match the documentation.
In the ADBCHelper API, any queries that fail because a connection has been deliberately closed by the user will be removed from the queue, regardless of the reconnection policy.
- PAM-24717
ADBC incorrect behavior using `force` on `closeDatabase` for shared connections.
Queries/commands previously failed to be stopped when closing a shared database connection with the `force` flag set to true. This issue has been fixed. A warning is given to the last closing connection if any queries from any connection are still running.

Correlator

- PAM-29036
Hostile network conditions slow down client connections due to `gethostbyname` timeouts.
Client connections to a correlator which is having network issues and cannot look up host names are no longer very slow to connect.

- PAM-28549
Can't cast negative numbers to `any` without parentheses.
In order to cast a negative number to an `any` type, we needed to wrap the negative number with parentheses. Negative numbers can now be cast as `any` types without adding any such parentheses.
- PAM-28489
`\u` Unicode escape sequences provided via the properties file are not well processed by the correlator.
Correlator properties files now correctly implement `\u` escape sequences to encode UCS-2 characters. Characters from outside the Basic Multilingual Plane are only supported via a property file with the UTF-8 BOM at the start of the file.
- PAM-27825
Performance regression in Java event parser.
In the 10.1 release, the Java event parser performance degraded compared to the previous release. This is now fixed.

Software AG Designer

- PAM-29398
Performing `engine_deploy` for a project while in the project's directory can lead to an infinite loop.
In earlier releases, when using `engine_deploy` with an output directory below the input directory, infinite loops would result. The output directory will now be added as an implicit exclusion to prevent infinite loops.
The `engine_deploy` tool will now report an error if the same directory is provided for input and output, or if `".."` (that is, the parent directory) is used as part of an include or exclude pattern.
Note that to include or exclude both a directory and its contents, both `**/dir` and `**/dir/**` need to be specified.
- PAM-29375
Designer project tree does not update when adding adapters until manual refresh.
A regression introduced in 10.2.0 which caused adapter nodes to not update until manually refreshed has been fixed so the adapter nodes will update when modified.

Other

- PAM-29520
Latency sample produces incorrect output.
The provided latency sample was not generating "Nth percentile sample latency" as described in the readme. The sample has been updated to produce the correct output as mentioned in the readme and improved to use the `any` type.

Release 10.3.0

Connectivity and Adapters

- PAM-29835
OutOfMemoryError in JMS XPath due to Saxon-B TinyTree averageNamespaces bug after processing large number of messages.
XPath expressions evaluated by JMS mapping/conditional rules could lead to a sudden out of memory condition as a result of an integer overflow in the library used. This error would only manifest after a very large number of XPath evaluations (close to 2^{31}), so in practice would only be seen after at least several 10s of millions of messages had been received. This issue has now been resolved.
- PAM-29518
Correlator shutdown hangs indefinitely if HTTP client requests are outstanding.
If the remote HTTP server starts to time out before the correlator is shut down, then the HTTP client request times out for any queued or current requests. This HTTP client request timeout can take a long time. This issue has been fixed. Now, the HTTP client request will go through only one timeout, and then ignore all of the other queued requests.

Correlator

- PAM-29838
Correlator crash spawning `any`.
A crash has been fixed spawning to a context an action variable closed over a type with string constants where the type was only referenced via an `any` and not statically in the spawning context.
- PAM-29634
Correlator crashes upon accessing management plug-in API.
Due to a race condition it was possible for the correlator to crash during startup if EPL injection was performed using the `initialization` YAML configuration, and if that EPL invoked the management plug-in's `Component.getInfo()` action. This issue is now resolved.
- PAM-28664
Correlator abort in `debugProgressLocalsGetFn/toStringGraph` while debugging.
An issue causing a crash when inspecting uninitialized optional values in the correlator debugger was found. This issue has now been resolved.
- PAM-29565
Permanent split brain in clustered queries due to the primary key optimization.
A bug was fixed in which the contents of an Apama queries window could diverge between correlators that were executing Apama queries in a cluster. This data divergence would only usually occur if the injection order of the Apama queries differed between correlators. Since this fix will change how some data is stored in the underlying data store, if you were running queries prior to the fix installation, there may be a loss of temporary in-process data after the fix is applied. For proper Apama query results, all correlators in the cluster must have the fix applied.

- PAM-29311
LLVM caching does not take primitive constants into account as dependencies.
EPL that uses only primitive constants in the event type is not counted as depending on that event type and that breaks the LLVM caching. This issue has been fixed. Now data-only events are counted as dependent on whatever uses them.
- PAM-29377
Occasionally lose a few lines or crash during log rotation.
The issue has been fixed whereby in some cases, it was possible for the correlator to lose a few lines or, in extreme cases, crash during log rotation.
- PAM-29233
Correlator crash on Linux when logging bumps up against disk limits.
When the correlator cannot log due to disk limits, the correlator will now attempt to log a helpful error message and call immediate exit instead of crashing.
- PAM-29143
Correlator crash in interpreter for unmatched `switch` case.
In some cases, it was possible for the correlator to crash if an EPL exception were thrown during `switch` statement execution. This issue has been fixed.

Dashboards

- PAM-29215
Images from SL-supplied jar files not rendering correctly.
Images from the embedded SL jars, that were attached to HTML5 labels, were broken and the invalid path of the image was shown in place of the broken image. This issue was seen only in the Display Server deployed dashboard. This issue has now been fixed and images from the SL jars are now rendered properly in the deployed dashboard.
- PAM-29291
In dashboards, the button foreground (font) property is not honored when the button is disabled (always grey).
In previous versions of Apama dashboards, the foreground color of a disabled button was always grey. In this fix, there is a new property to allow for the selection of a specific foreground color when a button is disabled. The default will remain grey.

EPL Plug-ins

- PAM-29511
Python plug-in logging needs to be less spammy.
The Python plug-in would log messages unnecessarily at `INFO` log level. The implementation has been changed to log several issues at `DEBUG` to reduce `INFO` level logging.

- PAM-29295
HTTP client transport should not send `Accept-Encoding: *` since we do not support all encodings.
The HTTP client no longer incorrectly sends `Accept-Encoding: *` as a header since we do not accept gzip encoding.
- PAM-29260
Crash sending recursive types from plug-ins.
A crash in the correlator when sending events containing cycles or any values from EPL plug-ins has been fixed.
- PAM-29116
HTTP Generic client sends `GET` requests with `payload = ""` by default.
If no value was specified for the payload in EPL, we sent an empty string as a payload. Some servers assume that there will be no payload, despite a `Content-Length` header and fail to read the request. This issue has been fixed. Now `GET` requests do not have any payload unless the user specifies this in the EPL.
- PAM-29115
Mapper codec - `defaultValue` overrides metadata values.
The `defaultValue` rule of the Mapper codec will no longer always be applied to metadata fields, and instead will only be applied in the case of an empty/null metadata field.
- PAM-29039
The `persist()` method on the Management interface sometimes fails to call back.
The persistence thread would sometimes get blocked while waiting for a large snapshot interval to expire. The fix mitigates the issue which happens only when `snapshotInterval` is set to a very large number causing the thread to miss the signal from a context.

Software AG Designer

- PAM-29521
No Designer support for hash methods.
The `hash()` method has been added to the completion proposal list for the following built-in types: `boolean`, `any`, `Channel`, `context`, `location`, `decimal`, `dictionary`, `Exception`, `float`, `integer`, `optional`, `sequence`, `StackTraceElement`, and `string`.
- PAM-29434
Issue with auto-completion of several methods of the `any` type.
The following methods have been added to content-assist for the `any` type :
`hasAction(string actionName)`, `hasEntry(any key)`, `hasField(string fieldName)`, `parseType(string typeName, string stringForm)`, `empty()`, and `hash()`.

- PAM-29231
`engine_deploy --outputCDP` does not correctly package queries.
 When using the `engine_deploy` tool to create a correlator deployment package from a project using the `--outputCDP` option, any query files (.qry) in the project would not be correctly converted. This would manifest as injection errors at the point the user attempted to inject the CDP into the correlator. This issue has been fixed.
- PAM-28577
 Linked-resources are not getting honored from dependent bundles.
 Projects were not considering linked resources inside of dependant bundles when resolving dependencies, leading to errors for the dependant bundles. Linked resources will now be included when resolving dependencies of dependant bundles.
- PAM-28576
 Terminate and relaunch from history fails for Apama correlator.
 In previous versions, the Designer process would sometimes hang if **Terminate and Relaunch from history** was used. The confirmation dialog to confirm stopping of the project was removed as this caused a race which led to a Designer deadlock.
- PAM-28026
Connectivity and Adapters node should be visible in all projects.
 The **Connectivity and Adapters** and the **EPL bundles** nodes are now shown for every project irrespective of whether the project has an adapter/bundle or not. Now users can add adapters/bundles by right-clicking the respective node . The **Add Connectivity and Adapters** and **Add Bundle** commands have therefore been removed from the **Apama** context menu.

Documentation

- PAM-28945
`optional.parse` is wrong about the string form of optionals.
 The EPL comments which generate the ApamaDoc documentation for `optional.parse` have been updated to correctly reflect the correct string form which can be parsed.

APIs

- PAM-29583
 Connectivity and EPL plug-in headers - bugs with modern compilers.
 An error in the connectivity and EPL plug-in headers has been fixed, which failed to compile in more recent compilers than provided by default on C++11. An issue has also been fixed which assumed you would be importing with `using namespace` instead of importing symbols individually.

Release 10.2.0

Correlator

- PAM-29143
Correlator crash in interpreter for unmatched switch case.
In some cases, it was possible for the correlator to crash if an EPL exception was thrown during switch statement execution. This issue has been fixed.
- PAM-29092
Crash when quitting event expressions with a single string equality filter.
A correlator crash caused by the incorrect management of the lifetime of string objects used in single-value listeners has been fixed.
- PAM-28797
`StatusItem::setStatus(const std::string &)` not thread safe in C++ connectivity API.
The connectivity helper class function `StatusReporter::setStatus(std::string)` is now thread safe.
- PAM-28663
Correlator crash when calling action on an event instance created through reflection.
A potential crash while calling an action on an event created through reflection has been fixed.
- PAM-28643
Intermittent crash in `persistObjects`.
A rare crash when a context goes empty (when the last monitor instance in it terminates) while events are being delivered to it when using persistence has been fixed.
- PAM-28591
Correlator crash in LLVM mode when using `any()` syntax to create an empty `any` value.
A correlator crash in LLVM mode when creating an empty `any` value using `any()` syntax has been fixed.

EPL Plug-ins

- PAM-29091
Connectivity “weather” sample relies on an API being removed in July.
The geo-location API used for the Weather sample (freegeoip.net deprecated in July 2018) has been updated.

Dashboards

- PAM-24000
Dashboard HTTP XML request for `info/envp` fails if environment variable has invalid Unicode characters.
An issue has been fixed so that Unicode characters, both valid and invalid ones, can be passed.
Even the surrogate pairs (multi-byte or wide characters) can be passed. No exception shall happen.

Release 10.1.0

Software AG Designer

- PAM-26968
Cannot install Apama products incrementally using Command Central.
Once Apama server is installed via Command Central, attempting to install components via Command Central that have a dependency on Apama server will fail. The only alternative is to install all components that have a dependency on Apama server at the same time. This issue has been fixed.

Adapters

- PAM-28320
RabbitMQ should be enabled as a JMS provider.
Support for RabbitMQ as a JMS provider has been added. There is no drop-down to select RabbitMQ in Software AG Designer 10.1, but RabbitMQ can be configured using JNDI configuration.

ADBC

- PAM-28264
Memory leak in ADBCHelper API `doSQLQuery`.
A per-query memory leak in the ADBC adapter has been fixed when running multiple `select` queries.

Correlator

- PAM-28338
Copies of optionals in cyclic values are not persisted correctly.
A bug has been fixed where cloned `optional` values containing cyclic types could result in a corrupt persistence database which would crash the correlator when trying to recover.
- PAM-28309
Monitors may not be garbage-collected sufficiently frequently - large strings.
Monitor instances now count the sizes of containers and strings and use these sizes to determine when to perform garbage collection. This avoids excessive memory usage and improves performance if using persistence by reducing the amount of garbage objects persisted.
- PAM-28269
Persistent monitors may not be garbage-collected sufficiently frequently - large containers.
Monitor instances now count the sizes of containers and strings and use these sizes to determine when to perform garbage collection. This avoids excessive memory usage and improves performance if using persistence by reducing the amount of garbage objects persisted.

- PAM-28248
Race to losing context names and state from persistence database.
A defect has been fixed to prevent a race condition in an edge case that could, if certain application patterns were followed, lead to a context losing its name and public flag (that is, not receiving events sent to the default channel).
- PAM-28169
Crash in garbage collection in a persistent correlator: persisting an event on a queue incorrectly sets `containingContext`).
A correlator defect has been fixed where an event on a context queue at the point when a persistent snapshot was taken would be left in a slightly incorrect state. If the context that was processing it then performed certain actions, this could lead to a race condition whereby subsequent garbage collection of a string from the event in a monitor instance could crash.
- PAM-28137
Deadlock in persistent correlator during CDP injection.
A rare deadlock which was introduced by a previous fix, has been fixed. This deadlock could occur when injecting a CDP containing event files into a persistent correlator.
- PAM-27506
Flow control is to be added if persistence snapshots fail to complete in a reasonable time.
Tighter flow control has been implemented, blocking external senders sending events into a persistent correlator if the correlator has not been able to complete a persistent snapshot. This should avoid excessive queuing of JMS events in reliable receive databases.
- PAM-27991
Crash in recovering a `MonitorAdder` of a non-persistent monitor instance.
A defect where the correlator could crash if recovered immediately after injecting a non-persistent monitor has been fixed.
- PAM-27964
Monitor-internal events of non-persistent monitors should be persistable.
A defect where the correlator would not correctly handle monitor-internal events from other monitors in a persistent monitor accessed via the `any` type has been fixed.
- PAM-27775
`engine_debug` cannot access numbers above 999.
The command line EPL debugger (`engine_debug`) and the EPL debugger available through Software AG Designer did not work with monitor instance IDs (or other numbers) above 999. This restriction has been removed.
- PAM-27626
Terminated `mThread`'s dictionary contents are not removed from persistence database.
A correlator defect has been fixed which would leave redundant entries in the persistence database if a monitor instance was terminated while it had non-empty dictionary objects.

- PAM-27370
Coassigning a cyclic object in a persistent monitor can cause the correlator to crash.
A defect with the incorrect persistence of an object with a cyclic data structure that is copied into a persistent monitor has been fixed.

EPL Plug-ins

- PAM-28374
Profiling showing zero for `getTotal` output for plug-ins.
The profiling option `getTotal` no longer incorrectly returns zero for all columns other than cumulative time and CPU time.
- PAM-28159
HTTP server and client fail to parse unknown content-type parameter.
A bug has been fixed where the HTTP server and transport would reject messages which had a `Content-Type` with a non-standard parameter which also did not have a `charset` parameter. These messages are now accepted and the non-standard parameters are ignored.
- PAM-27910
MQTT transport requires explicit configuration of SSL options for non-SSL use.
The default value for `acceptUnrecognizedCertificates` in the MQTT bundle has been corrected to be `false` rather than the empty string.
- PAM-27816
Occasional core dump in `MQTTAsync_receiveThread/MQTTAsync_retry`.
When the MQTT transport dropped a connection to a broker due to an authentication or SSL error, on very rare occasions the transport would lock up or cause a correlator crash. This has now been fixed.
- PAM-27360
HTTPClient inserts nulls into data stream around the 100k mark.
The HTTP client with long messages could insert nulls into the message if it was longer than 100k (but not all bytes after 100k), which then caused the resulting string to appear truncated. The result would be 100k of data, then 100k of 0s, followed by more data. This has been fixed so that all the message data is now available.
- PAM-27296
Wrong object type created when a `Channel` object is constructed from a context inside a Java plug-in.
In a Java plug-in, if a `com.apama.epl.plugin.Channel` object was constructed from a `com.apama.epl.plugin.Context`, the returned object type was `com.apama.epl.plugin.Context` - which is incorrect. This issue has been fixed such that the expected object type is now returned.

- PAM-27150
Sending events to Kafka at a high rate can result in some being dropped.
This is a Kafka issue. The producer should not be dropping events when there is progress. The workaround is defaulting `request.timeout.ms` to `Integer.MAX_VALUE`. This value is now the default (the user can override it though).

Dashboards

- PAM-28121
Improper handling of decimal types with `--enhancedQuery` mode.
Decimals support in the dashboards as double with `enhancedQuery` mode is now enabled.

Other

- PAM-26580
`engine_management` return code is 0 for failure.
In the majority of cases, `engine_management` gave a zero return code in the previous release, even when it failed. It will now give a non-zero return code on failure.

Release 10.0.0

ADBC

- PAM-24864
`ADBC deleteStoreStatement` does nothing and cannot be used.
The `deleteStoreStatement()` now works correctly.

Software AG Designer

- PAM-27151
The command `engine_deploy --outputDeployDir <relative path>` fails only when DES is enabled.
YAML generation was failing when a project with Digital Event Services (DES) enabled was exported to an output directory specified with a relative path. This issue is fixed now.
- PAM-27177
ApamaDoc export fails when the Apama project contains query files.
When ApamaDoc is generated for an Apama project containing query files, the operation fails. This issue has been fixed.

- PAM-27039
Ant run fails if a project has a parent excluded folder and a child folder has a jar.
If an Apama project contains an excluded parent folder and an included inner child folder which contains a jar file, Ant failed with this error:
`"IllegalStateException: Workspace is closed"`
This issue has been fixed whereby any included folders, inside the excluded folder, will have their files injected correctly into the correlator.
- PAM-27012
Ant exported build.xml has absolute path for the standard-codecs.yaml configuration file.
When a Software AG Designer project containing connectivity plug-ins was exported to an Ant script, the resulting build.xml used an absolute path to refer to some of the YAML files. This may have prevented the script from running correctly on other machines and operating systems. This issue was fixed in 10.0.0.1.
- PAM-26942
Exporting CDP to the same (exported earlier) location is showing an error dialog in Designer.
If a CDP file was exported to an already existing file, then the CDP export wizard showed a warning and after clicking **Finish**, it failed with the exception "File already exists". This has been fixed to just show a warning, but no exception will be thrown. Also, if there are multiple projects with the scenario file using project blocks and if the user tries to do a CDP export without opening the scenario file, then the export failed with an exception. This issue was fixed in 10.0.0.1.
- PAM-26189
Invalid stream query inputs in combination with equi-join can crash the correlator/Designer.
An EPL stream query that uses an equi-join and has an invalid input item will cause the correlator to crash upon injection, or cause a fatal error in Software AG Designer when built inside an Apama project. For example:

```
from e1 in noSuchVariable join e2 in all E() on e1.i equals e2.i select  
f(e1, e2)
```


This has now been fixed in both the correlator and Software AG Designer.

Correlator

- PAM-26964
It is no longer possible to inject the Management.mon file followed by the OutOfBandEventDefs.mon file, due to a change in the management plug-in which both use.
When injecting the Management.mon file followed by the OutOfBandEventDefs.mon file, the error message looked like:

```
Error injecting monitorscript from file  
monitors/outofband/OutOfBandEventDefs.mon: Error on line 138: Trying to  
return a 'sequence<unknown type>' from an action which returns a  
sequence<com.apama.oob.ReceiverConnected> (error reported to client)
```


This was fixed in 10.0.0.1. The OutOfBandEventDefs.mon file now uses the new OOBPlugin, not the ManagementPlugin, which removes an injection ordering dependency between Management.mon and OutOfBandEventDefs.mon.

- PAM-26730
Repeated calls to `monitor.subscribe()` cause memory leak.
In previous releases, calling `monitor.subscribe()` from EPL would allocate some additional memory for each call even if the current context was already subscribed, which in some cases would mean EPL applications would have needed to perform their own reference counting to avoid repeated calls using more memory. This has now been fixed and EPL applications can call `monitor.subscribe()` any number of times from a given context without any extra memory being allocated.
- PAM-27032
Correlator crashes with YAML configuration files with invalid spacing in maps.
The correlator would crash if a YAML file with invalid spacing in maps was provided. This has been fixed such that an error will be generated in lieu of crashing when invalid YAML files are read.
- PAM-27017
Changing `storeLocation`, `storeName` is broken when writing input log.
An error has been fixed in handling command line arguments where the correlator would always use the default persistence database name and location as the source to copy the persistence database into the input log.
- PAM-26826
Correlator crash when sending in malformed `&TIME` events.
This issue is with the correlator crashing on Windows while trying to parse an `&TIME` event containing a single backslash inside, for example:
`&TIME ("a\\")`
The backslash was expected to be followed by a valid escape sequence such as `n`, `quote`, `t` etc. If the backslash was not followed by a valid escape sequence, then this resulted in an unhandled exception on Windows, causing a correlator crash. This has now been fixed.

6.0 Documentation Changes

This section describes significant changes to the documentation, such as the addition, relocation, or removal of product guides, online help, chapters, or other major content. A release is listed in this section only if changes occurred in that release.

7.0 Terminology Changes

A release is listed in this section only if changes occurred in that release.

Release 9.12

Old Term	New Term
Correlator plug-in	EPL plug-in

Release 9.9

Old Term	New Term
Apama Studio	Software AG Designer

8.0 Added, Removed, Deprecated, or Changed Items

See *Release Notes* in the Apama documentation.

9.0 Added, Removed, Deprecated, or Changed Built-In Services

See *Release Notes* in the Apama documentation.

10.0 Added, Removed, Deprecated, or Changed Parameters

See *Release Notes* in the Apama documentation.

11.0 Added, Removed, Deprecated, or Changed APIs

See *Release Notes* in the Apama documentation.

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