# SharePlex™ 9.0.1

# Release Notes

**Revision: 9/13/2017**

# About SharePlex

SharePlex provides high-speed replication from Oracle and SQL Server databases to different target databases and messaging containers on major Unix, Linux and Windows platforms — both on-premise and in the cloud. SharePlex supports a wide variety of configurations to meet different and complex data availability needs.

SharePlex supports reliable Oracle high availability configurations where replication maintains a duplicate database in a different location that is ready for fast, seamless failover and failback in planned or unplanned mode.

You can also use SharePlex to replicate data from Oracle and SQL Server sources to maintain a change history database in an Oracle target. Rather than updating or deleting target rows based on the source change, SharePlex inserts a new row on the target for every source change. The result is an archive that reflects the chronological history of every change made to the source database.

SharePlex also includes, at no extra charge, the compare and repair tools that you need to verify the accuracy of a target maintained by replication. These tools not only detect hidden out-of-sync conditions, but they also repair the target to restore parity of your source and target data.

SharePlex value and versatility continues to grow with the requirements and requests of our customers. Although SharePlex is a reliable, relatively low-maintenance solution, our top-rated support team is ready around the clock to help with any trouble you may have. To get you started with your deployment, our professional services team is highly experienced and readily available.

# Join our community

For expert advice and the latest news about SharePlex, join the SharePlex Community at www.quest.com/community. Take advantage of our forums, blogs, videos, and more from our own experts, as well as input from our customers and partners.

# About this release

This is a patch release with some new functionality.

# New features in this release

## New in version 9.0.1

SharePlex now supports the replication of SQL Server identity columns between SQL Server source and target databases.

## New in version 9.0

For more information about each of these features, see the documentation that is provided with that release.

### Note about the documentation:

The following content from the Administration Guide has been moved to the Installation Guide:

- *Set up an Oracle environment for replication* (Formerly *Prepare an Oracle environment for replication*)
- *Set up replication between different database types* (Formerly *Configure replication to Open Target targets*)

Additionally, the Installation Guide now includes the following new setup topics:

- *Set up replication between SQL Server databases*
- *Installation and setup for cloud-hosted databases*

### Capture from SQL Server tables

SharePlex can now capture from Microsoft SQL Server tables. The following are specifics for configuring SQL Server tables for capture:

| Configuration Requirement | Description |
| --- | --- |
| Configuration file | To specify a SQL Server capture datasource, use an **r** rather than an **o** on the datasource specification line of the configuration file:<br>**Datasource: r.***database*<br>    *where: database* is the actual name of the database, not a Data Source Name (DSN) or instance name. |

| Configuration Requirement | Description |
| --- | --- |
| | SQL Server can be configured to be case-insensitive or case sensitive. For case-insensitive databases type a table name or column name in upper or lower case in the configuration file. For case-sensitive databases type a table name or column name in its case-sensitive form and enclose it within double quotes. For example:<br><br>  ○ case-insensitive: **SALES.ACCOUNTS**<br>  ○ case-sensitive: **"Sales"."Accounts"**.<br><br>The way to specify a SQL Server target remains the same. The basic syntax is: **host@r.**_database_name_. |
| Non-supported SharePlex features | Certain SharePlex features are not supported when capturing from SQL Server tables |
| Scope of support | The SQL Server capture feature supports the following:<br><br>• Only DML operations are supported. DDL replication is not supported from a SQL Server source.<br>• SQL Server source and target tables must have a **primary key**.<br>• Only committed transactions are processed.<br>• Restarting replication from a previous point in time is not supported.<br>• SQL Server source tables must be quiesced for the activation process.<br>• SharePlex does not support replication from SQL Server tables to other tables within the same SQL Server database. Replication between databases in the same SQL Server instance is supported.<br>• You can have both a SQL Server source and an Oracle source replicating data to the same target.<br>• You can activate two or more databases in a SQL Server source all going to the same, or different, targets.<br>• See additional requirements, guidelines and setup instructions in the SharePlex Installation Guide.<br><br>For objects, operations, and target/platform combinations that SharePlex supports when capturing from SQL Server, see the System Requirements. |
| Installation | See the SharePlex Installation Guide provided with this release.<br>NOTE: The **mss_setup** utility now prompts you to specify whether the database is a SQL Server source. A **Yes** response directs the setup program to prepare the source database for replication. |
| Activation and instantiation | The **reconcile** command now has an **lsn** option to enable the command to reconcile to a specific SQL Server transaction **lsn** number. |

# Support for MySQL

SharePlex now supports replication to a MySQL target. Ther following new utilities support this target:

- **mysql_setup**: Sets up connectivity to the MySQL database for SharePlex.
- **mysql_cleansp**: Restores a MySQL replication environment to a clean state.

For more information about these utilities, see the SharePlex Reference Guide.

# New horizontal partitioning configuration

Horizontal partitioning is now completely database-independent and no longer requires inserts into a database table.
To configure horizontal partitioning, you use the following commands in **sp_ctrl**:

**add partition**

**drop partition**

**drop partition scheme**

**modify partition**

**view partitions**

See the *SharePlex Reference Guide* for more information.

# Event log aging

The SharePlex event log is no longer truncated when the file reaches its maximum size. Now, when file reaches its maximum size, it is renamed to **event_log_***n*, where *n* is a sequence number, and then a new file is created as the active log. For example, when the first event log reaches its maximum size, it is renamed to **event_log_0000000001** and then a new file is opened as the active event log. When that file reaches its maximum size, it is renamed to **event_log_0000000002**, and so forth.

# New and changed parameters

The following parameters were introduced.

- **SP_OPO_NLS_DEFAULT_COMPAT:** This parameter controls whether Post converts character data (CHAR, VARCHAR). By default no conversion is performed. When set 7, Post will not convert character data, but will convert CLOB data. The compare/repair commands will compare and repair character data without conversion and CLOB data with conversion. The replication of NCHAR data is not affected. SP_OPO_NLS_DEFAULT_COMPAT takes precedence over SP_OPO_NLS_CONVERSION.
- **SP_OPO_UPDATE_SCN**: This parameter controls the tracking of Oracle SCNs and allows SharePlex to recover quickly when operating in a high-availability cluster. When this parameter is enabled, SharePlex tracks SCNs in its internal transaction table. This enables SharePlex to activate to the lowest applied transaction and then reconcile to the correct transaction when there is a failover.

- **SP_DEQ_PARTIAL_REPAIR_CLR_OOS**: This parameter enables the repair process to clear out-of-sync messages from the **statusdb** for a table after a compare-repair of only a subset of rows of that table, such as:

  - Row subsets specified with a WHERE clause or an Oracle [sub]partition name.
  - Row subsets specified with horizontally partitioned replication.

- **SP_OCT_DDL_UPDATE_CONFIG**: This parameter controls whether SharePlex updates the table name in the configuration file when processing ALTER TABLE RENAME. By default, SharePlex updates the table name when it processes this DDL operation. To prevent updates the configuration file, disable this parameter.

- **SP_OCT_TRUNC_PARTITION_BY_ID**: For Oracle 12.2 or later, setting SP_OCT_TRUNC_PARITION_BY_ID is not necessary, and the setting of the parameter will be ignored. The requirement to set it for earlier Oracle versions still remains. For more information about setting this parameter, see the *SharePlex Reference Guide*

See the *SharePlex Reference Guide* for more information.

# Delete queue enhancements

The **delete** commands to delete queues and export processes have been simplified. The following are the new commands:

> **delete capture queue for** *datasource*
>
> **delete export process to** *host* [**queue** *queuename*]
>
> **delete export queue** *queuename*
>
> **delete post queue** *queuename* **for** *datasource-datadest* [**cleartrans**]

See the *SharePlex Reference Guide* for more information.

# Support for IPv6

SharePlex now supports the IPv6 protocol. SharePlex automatically detects whether IPv4 or IPv6 is in use on a server.

**NOTE:** See the System Requirements for platforms that were tested.

# Deprecations in this release

This section contains a list of SharePlex items that were deprecated in this release line.

NOTE: For a list of all deprecated parameters and commands, their replacements (if any), and the version of SharePlex in which they were deprecated, see the SharePlex Reference Guide.

## 9.0.1

None.

## 9.0

- The name of the SP_OCT_TARGET_COMPATIBILITY parameter has been changed to SP_SYS_ TARGET_COMPATIBILITY.

- The SP_XPT_ALTERNATE_HOST parameter is deprecated. To update the SharePlex configuration with the alternate IP address, run the **provision** utility. For more information, see the SharePlex Reference Guide.

# Resolved Issues in this release

## Resolved in version 9.0.1

| Issue ID | Description |
| --- | --- |
| SPO-3354 | Issues with conflict resolution enhancement |
| SPO-3521 | Fix SP_OPO_LOG_CONFLICT minor issue in 8.6.6 |
| SPO-10270 | Out sync for LOB data on Windows platform. |
| SPO-10493 | OOS in datetimeoffset(0), time zone is wrong is target from sqlserver to sqlserver |
| SPO-10520 | OOS on character data from SQL Server to Oracle |
| SPO-10565 | oracle 10g : post core dump on varray |
| SPO-10605 | Reader error : invalid data when activate vertical partition config of char. |
| SPO-10669 | Missing asm_user and asm_password when asm tns_alias is supplied. |
| SPO-10699 | Add Application Name to ODBC Connect Strings. |
| SPO-10740 | SharePlex Manager reports export and import processes incorrectly if the shareplex version is 9.0.0. |
| SPO-10742 | Replicate failed when delete data from Sqlserver capture to oracle target. |
| SPO-10808 | Verify config on sql server capture generates too many sessions and not exit automatically. |
| SPO-10819 | Turn compiler optimization on. |
| SPO-10821 | Kafka target post crash recovery logic is broken for complete rollback |
| SPO-10826 | Invalid SCN reported in conflict log. |
| SPO-10827 | Fix HostPriority conflict resolution routine. |
| SPO-10871 | Implement live parameters for SQL Capture. |
| SPO-10875 | On Windows, ora_cleansp is still trying to truncate shareplex_routes table and fails |
| SPO-10896 | socket_test failed on HPUX long system name > 8 bytes |
| SPO-10912 | When the target database fails a DML, OT post should provide a detailed source-target comparison in the post log. |

| Issue ID | Description |
|---|---|
| SPO-10916 | Issuing a Drop table on replicated table with parameter SP_OCT_ALLOW_DP_DDL=1 caused capture to core. |
| SPO-10922 | Compare server SIGSEGV. |
| SPO-11031 | Post core dump processing SecureFile Compressed LOB |
| SPO-11084 | Windows ora_cleansp should not truncate shareplex_routes or shareplex_wildcard |
| SPO-11091 | Poster SIGSEGV when testing DDL/DML on tabs having varray on diff schema |
| SPO-11246 | Errors found in the event_log after upgrade SharePlex to 9.x. |
| SPO-11247 | Fix issue with SID case sensitivity exercised after upgrade. |
| SPO-11323 | Fix performance regression in sp_cnc processing of the compare command. |
| SPO-11180 | Repair did not clear statusdb because marker was sent to wrong post queue |

# Resolved in version 9.0

| Issue ID | Description |
|---|---|
| 112521 | Fixed an issue with 'show config' which occurs when 'alter table' and 'create table' DDLs are being processed |
| 112522 | Fixed an issue with 'show config' which occurs when 'create/drop sequences' DDLs are being processed |
| CR-111905, CR-111920 | Support SP_OCT_ARCH_LOC on ASM |
| CR-112069 | Added a parameter to not automatically update the configuration entry when a RENAME is encountered. |
| CR112117 | Restart on log_wrap; retry on failure to find archive log in arch_loc. |
| CR-112244 | Support 'Comment on Column' DDL |
| CR-112454 | Route NOPs correctly for Hash Partitioned tables. |
| CR112476, SPO-3353 | Failed to repair view table that got constraint violation |
| CR-112484 | Enhancement for SQL Server alter table oracle number 1 ) number (without precision) to SQL server float 2) number(x;y) to sql server numeric(x;y) |
| CR-112503 | Support sybase ntypes for Thai character set |

| Issue ID | Description |
|---|---|
| CR-112513 | Fix bug which caused updates with 'not nullable' columns to be filled with NULL |
| CR112519, 112518, 112520 | Fixed issues with DDL loopback in master/master setup |
| CR112520 | Problem when Post processed Alter Table operation in the presence of Drop Table DDL with the same name. |
| SPO1489 | implement 7.5/8.x NLS compatibility |
| SPO-2338 | Rework system generated partition implementation |
| SPO-2443 | Do not put SQL into errlog when in secure mode. |
| SPO-2444 | Allow hidden password for ora_cleansp. |
| SPO-2457 | When the event log reaches its maximum size, copy it to a sequenced filename and restart the event_log |
| SPO-2629 | Fixed privilege issue in ppas_setup to RDS target |
| SPO-3079 | Open Target Post fails when Sybase target is bigdatetime. |
| SPO-3592 | Fix lost connection issue causing OOS |
| SPO-3954 | In a PDB environment, the sync process failed when the ORACLE_SID did not match what is stored in the registry. |
| SPO-9719 | Create table for autoadded tables were sent more than once if there was more than one line for an expanded route |
| SPO-9749 | Fix oracle conversion big number such as 999e123 |
| SPO-9775 | Support JSON format for Kafka |
| SPO-9997 | Frequent checkpoints generated with ODR_UPDATE_INTERNAL for grant select operations when SP_OCT_REPLICATE_GRANT parameter was enabled. |
| SPO-10041 | Virus protection software on the server caused SNMP traps not to work |
| SPO-10046 | Unexpected LMN record caused capture failure |
| SPO-10051 | Capture failed when it saw drop table with comments followed by create table with comments. |
| SPO-10058, CR112522 | Capture: ReconcileLog: failed to remove object cache, which caused the whole object-cache to be written to the object-cache during checkpoint duplicating the entries in the OCache log. |
| SPO-10094 | Reconcile created an oracle post object cache when it processes an activation |
| SPO-10108 | Compare and repair error (interval partition) |
| SPO-10144 | Poster failed on partial rollback when updating shareplex trans table |

| Issue ID | Description |
| --- | --- |
| SPO-10189 | Dropping a replicated sequence with autoadd sequence off caused object-cache to be updated |
| SPO-10267 | Capture failed due to regression from the initial fix. |

# Basic system requirements

Before installing SharePlex, ensure that your system meets the minimum hardware and software requirements.

- SharePlex processes are all 64-bit and can exceed 4 GB.

- Per process memory of greater than or equal to 256 MB is required.

- See the Preinstallation Checklist in the SharePlex Installation Guide for additional system and/or database requirements.

# Internet protocol

SharePlex supports both IPv4 and IPv6 internet protocol. The following table shows the platforms for which SharePlex was tested with IPv6.

| Platform | Source | Target | SharePlex Source and Target versions | On-premise/Cloud |
|---|---|---|---|---|
| Linux RHEL | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| Linux RHEL | Link-Local IPV6 | Link-Local IPV6 | 8.6.5 - 9.0 | On-premise |
| Linux RHEL | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 8.6 | On-premise |
| Linux Suse | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| Windows | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| Windows | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 8.6.4 | On-premise |
| HP UA | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| HP IA | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| SUN Sprac | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| SUN Solaris | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| AIX | Link-Local IPV6 | Link-Local IPV6 | 9.0 - 9.0 | On-premise |
| Linux RHEL | Public IPV6 | Public IPV6 | 9.0 - 9.0 | Cloud |
| Windows | Public IPV6 | Public IPV6 | 9.0 - 9.0 | Cloud |

# Interoperability between versions

Refer to the following guidelines if the system where you are installing the current version of SharePlex is in a configuration where one or more other systems will continue to use an older version. An example would be where you are installing or upgrading SharePlex on a target, but the source will continue to use SharePlex 8.5 or earlier.

**Versions with full interoperability**

The following SharePlex versions are fully interoperable, including the Compare/Repair feature:

8.0.x

8.5.x

8.6.x

9.0.x

To support replication from a higher to a lower version, set the SP_SYS_TARGET_COMPATIBILITY parameter on the source system to the *lower* SharePlex version. If Capture is running, restart it.

IMPORTANT: Downgrading from a higher to a lower version of SharePlex is not supported.

NOTES:

- The older version of the SP_SYS_TARGET_COMPATIBILITY parameter, SP_OCT_TARGET_ COMPATIBILITY, has been deprecated in version 9.0.1. If your source SharePlex is currently replicating to a lower SharePlex version on the target and you have SP_OCT_TARGET_COMPATIBILITY set to the lower version, SharePlex will continue to use that value after you upgrade to version 9.0.1.

- If you upgrade the target to the current release at a future time, issue a reset for SP_OCT_TARGET_ COMPATIBILITY on the source system to remove it from the SharePlex environment. Going forward, SharePlex will use the setting of the new SP_SYS_TARGET_COMPATIBILITY parameter, which defaults to the current version.

### *To reset SP_OCT_TARGET_COMPATIBILITY*

1. Stop Capture.

   `sp_ctrl>`**stop capture**

2. In **sp_ctrl** on the source system, issue the following command:

   `sp_ctrl>` **reset param SP_OCT_TARGET_COMPATIBILITY**

3. Restart Capture.

   `sp_ctrl>` **start capture**

# Supported data stores

| Data Store | Type of Support | Version | Driver version |
|---|---|---|---|
| Apache Kafka | target | .08 and later | N/A <br> **NOTE:** A Kafka target is supported on Red Hat Linux |

| Data Store | Type of Support | Version | Driver version |
|---|---|---|---|
| | | | version 6.0 or later. |
| Flat file - SQL output | target | N/A | N/A |
| Flat file - XML output | target | N/A | N/A |
| JMS - ActiveMQ | target | 5.8 | N/A |
| JMS - IBM MQ | target | 7.x and 8.x | N/A |
| Microsoft SQL Server | source and target | 2012<br>2014<br>2016<br>NOTE: Supported as a source only on Windows 2012 R2. | Microsoft SQL Server ODBC Driver<br>Do *not* use the **Microsoft SQL Server Native Client**. SharePlex will return an error during setup if the correct driver is not used. To tell the difference between the two:<br><br>• The Microsoft SQL Server ODBC Driver has versions such as 06.02.9200.<br><br>• The Microsoft SQL Server Native Client has versions such as 11.00.3513. |
| MySQL | target | 5.6 and later | ODBC driver version 5.3.2 or later. |
| Oracle Database (64-bit only) | source and target | 10g R1 and R2<br>11g R1 and R2<br>12cR1 and R2 | N/A |
| PostgreSQL* (Symfoware Server, EDB Postgres Advanced Server, others) | target | 9.4 and later* | Use the driver version that is recommended by the vendor of the PostgreSQL implementation that you are using. |
| SAP Adaptive Server Enterprise (ASE) | target | 15.7 | N/A |
| SAP HANA | target | 1.0 SPS 11 Rev111 | HDBODBC or HDBODBC32 driver provided with the HANA database installation. |
| Teradata | target | 15.00.03.05 | Teradata ODBC driver version 15.10.00.01 or later |

\* SharePlex supports all implementations of the PostgreSQL open source object-relational database system.

# Cloud support

The following shows the configurations that SharePlex supports when either the source or target, or both, are cloud-based databases.

| Source | To Target |
|---|---|
| Oracle on EC2 Linux | Oracle on AWS EC2 Linux |
| Oracle on Azure Linux | Oracle on Azure Linux |
| Oracle on on-premise Linux | <ul><li>Oracle on AWS RDS</li><li>Oracle on AWS EC2</li><li>PostgreSQL (Community) on Azure Linux</li><li>PostgreSQL (Community) on AWS EC2</li><li>PostgreSQL (Community) on AWS RDS</li><li>EDB Postgres Advanced Server on AWS EC2</li><li>EDB Postgres Advanced Server on Azure Linux</li><li>Fujitsu Symfoware Server on AWS EC2</li><li>Fujitsu Symfoware Server on Azure Linux</li><li>MySQL on AWS EC2</li><li>MySQL on AWS RDS</li><li>MySQL on Azure Linux</li><li>Aurora on AWS RDS</li><li>SQL Server on AWS EC2</li><li>SQL Server on AWS RDS</li><li>SQL Server on Azure Windows (IaaS)</li><li>SQL Server on Azure Windows (PaaS)</li></ul> |
| SQL Server on on-premise Windows | <ul><li>SQL Server on Azure Windows</li><li>SQL Server on EC2 Windows</li></ul> |

# System Requirements — Oracle

This section contains information about SharePlex support for capture from an Oracle source database and replication to supported targets.

# Basic requirements

- SQL*Plus must be installed for any source or target Oracle Database.
- (Linux and Unix) Quest recommends setting the hard-limit of the system file descriptors to a minimum of 1024 or higher, as the system permits.
- A source Oracle database must have at least the minimum level of supplemental logging enabled. Some datatype or operational support may require PK/UK supplemental logging to be enabled.

# Supported platforms

This section shows the SharePlex support for replication from source Oracle *database-platform* combinations to target *database-platform* combinations, both Oracle and Open Target.

NOTES:

- Unless specified, Oracle, RAC, and ASM are supported for the same version.
- SharePlex supports only 64-bit Oracle Database.

## Supported platforms — Oracle source to Oracle target

IMPORTANT: See also Cloud support on page 18 for cloud-hosted targets.

| Platform | Oracle source or target | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | 10g* | 10gR2* | 11g* | 11gR2* | 12cR1* | 12cR2* |
| AIX 5.3 | Yes | Yes | Yes | Yes | No | No |
| AIX 6.1 | NA | Yes | Yes | Yes | Yes | No |
| AIX 7.1 | NA | NA | NA | Yes | Yes | No |

| Platform | Oracle source or target | | | | | |
|---|---|---|---|---|---|---|
| | 10g* | 10gR2* | 11g* | 11gR2* | 12cR1* | 12cR2* |
| CentOS 5.10 (x64) | NA | Yes | Yes | Yes | Yes | No |
| CentOS 6.5 (x64) | NA | Yes | Yes | Yes | Yes | No |
| Debian Release 8 (Jesse and Wheezy)*** | No | No | Yes | Yes | Yes | No |
| HP-UX 11.31 (11i v3) (PA-RISC) | Yes | Yes | Yes | Yes | NA | No |
| HP-UX 11.31 (11i v3) (Itanium) | Yes | Yes | Yes | Yes | Yes | No |
| Oracle Solaris 9 | Yes | Yes | Yes | NA | NA | No |
| Oracle Solaris 10 (SPARC) | Yes | Yes | Yes | Yes | Yes | No |
| Oracle Solaris 10 (x64) | Yes | Yes | NA | Yes | Yes | No |
| Oracle Solaris 11 (SPARC) | NA | NA | Yes | Yes | Yes | No |
| Oracle Solaris 11 (x64) | NA | NA | Yes | Yes | Yes | No |
| Oracle Linux 4 (x64) | Yes | Yes | Yes | Yes | NA | No |
| Oracle Linux 5 (x64) | NA | Yes | Yes | Yes | Yes | No |
| Oracle Linux 6 (x64) | NA | NA | NA | Yes | Yes | Yes |
| Oracle Linux 7 (x64) | NA | NA | NA | Yes | Yes | Yes |
| Oracle Linux 5 on Exadata 2, 3, 4 (x64) | NA | NA | NA | Yes | Yes | No |
| Oracle Linux 5.5 on Exadata 3, 4 (x64) | NA | NA | NA | Yes | Yes | No |
| Oracle Linux 6.6 on Exadata 5 (x64) | NA | NA | NA | Yes | Yes | No |
| RHEL 4 (x64) | Yes | Yes | Yes | Yes | NA | NA |
| RHEL 5 (x64) | NA | Yes | Yes | Yes | Yes | No |
| RHEL 6 (x64) | NA | NA | NA | Yes | Yes | Yes |
| RHEL 7 (x64) | NA | NA | NA | Yes | Yes | Yes |
| SuSE SLES9 (x64) | Yes | Yes | NA | NA | NA | NA |
| SuSE SLES10 (x64) | NA | Yes | Yes | Yes | NA | NA |
| SuSE SLES11 (x64) | NA | Yes | Yes | Yes | Yes | No |
| SuSE SLES12 (x64)** | NA | NA | NA | Yes | Yes | Yes |
| Windows Server 2003 (x64) | NA | Yes | Yes | Yes | NA | NA |
| Windows Server 2008 (x64) | NA | Yes | Yes | Yes | Yes | No |
| Windows Server 2012 | NA | Yes | Yes | Yes | Yes | Yes |
| Windows Server 2012R2 | NA | Yes | Yes | Yes | Yes | Yes |

**NA**: Not applicable: not supported by the database type or version.

**X**: Not yet tested.

* SharePlex only supports 64-bit Oracle Database. Linux running Oracle 11g must be running on Oracle 11.1.0.6.0+ or you must apply the one-off provided for Oracle Bug 6598432.

** At the time of this writing, Oracle's published documentation did not indicate support of SuSE SLES12. Basic testing of SharePlex has been done on SuSE SLES12. Quest will provide best effort support but cannot resolve specific Oracle issues on this platform until Oracle adds official support.

*** Oracle does not officially support Debian Linux.

# Supported platforms — Oracle source to Open Target

**IMPORTANT:** See also Cloud support on page 18 for cloud-hosted targets.

| Platform* | Can post to target on this platform (Yes/No) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | MySQL | SAP ASE | SQL Server | PostgreSQL** | SAP HANA | Teradata | JMS | Kafka | File |
| AIX 6.1 | NA | NA | NA | NA | NA | NA | Yes | No | Yes |
| AIX 7.1 | NA | NA | NA | NA | NA | NA | Yes | No | Yes |
| CentOS 5.10 (x64) | NA | Yes | NA | NA | NA | NA | Yes | Yes | Yes |
| CentOS 6.5 (x64) | NA | Yes | NA | Yes | NA | NA | Yes | Yes | Yes |
| Debian Release 8 (Jesse and Wheezy) | NA | Yes | NA | Yes | NA | NA | Yes | Yes | Yes |
| HP-UX 11.31 (11i v3) (PA-RISC) | NA | No | NA | NA | NA | NA | No | No | No |
| HP-UX 11.31 (11i v3) (Itanium) | NA | No | NA | NA | NA | NA | No | No | No |
| Oracle Solaris 9 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Oracle Solaris 10 (SPARC) | NA | NA | NA | NA | NA | NA | Yes | No | Yes |
| Oracle Solaris 10 (x64) | NA | NA | NA | NA | NA | NA | Yes | No | Yes |
| Oracle Solaris 11 (SPARC) | NA | NA | NA | NA | NA | NA | Yes | No | Yes |
| Oracle Solaris 11 (x64) | NA | NA | NA | NA | NA | NA | Yes | No | Yes |
| Oracle Linux 4 (x64) | No | NA | NA | No | NA | NA | Yes | Yes | Yes |
| Oracle Linux 5 (x64) | No | NA | NA | No | NA | NA | Yes | Yes | Yes |
| Oracle Linux 6 (x64) | No | NA | NA | No | NA | NA | Yes | Yes | Yes |

| Platform* | Can post to target on this platform (Yes/No) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | MySQL | SAP ASE | SQL Server | PostgreSQL** | SAP HANA | Teradata | JMS | Kafka | File |
| Oracle Linux 7 (x64) | No | NA | NA | NA | NA | NA | Yes | Yes | Yes |
| Oracle Linux 5 on Exadata 2, 3, 4 (x64) | No | NA | NA | No | NA | NA | Yes | Yes | Yes |
| Oracle Linux 5.5 on Exadata 3, 4 (x64) | No | NA | NA | No | NA | NA | Yes | Yes | Yes |
| Oracle Linux 6.6 on Exadata 5 (x64) | No | NA | NA | No | NA | NA | Yes | Yes | Yes |
| RHEL 4 (x64) | Yes | Yes | NA | NA | NA | NA | Yes | Yes | Yes |
| RHEL 5 (x64) | Yes | Yes | NA | NA | NA | NA | Yes | Yes | Yes |
| RHEL 6 (x64) | Yes | Yes | NA | Yes | NA | NA | Yes | Yes | Yes |
| RHEL 7 (x64) | Yes | Yes | NA | Yes | NA | NA | Yes | Yes | Yes |
| SuSE SLES9 (x64) | Yes | Yes | NA | NA | Yes | NA | NA | Yes | NA |
| SuSE SLES10 (x64) | Yes | Yes | NA | NA | Yes | Yes (SP3) | Yes | Yes | Yes |
| SuSE SLES11 (x64) | Yes | Yes | NA | Yes | Yes | Yes (SP1) | Yes | Yes | Yes |
| SuSE SLES12 (x64)** | Yes | Yes | NA | NA | Yes | NA | Yes | Yes | Yes |
| Windows 2003 (x64) | NA | NA | Yes | NA | NA | NA | Yes | No | Yes |
| Windows 2008 (x64) | NA | NA | Yes | No | NA | NA | Yes | No | Yes |
| Windows Server 2012 | NA | NA | Yes | No | NA | NA | Yes | No | Yes |
| Windows Server 2012R2 | NA | NA | Yes | No | NA | NA | Yes | No | Yes |

* If a platform is not supported by a target type, it is not supported by SharePlex for that target type. For example, only R2 of Windows 2008 is supported by EDB Postgres Advanced Server, and therefore only by SharePlex.

** SharePlex supports all implementations of the PostgreSQL open source object-relational database system.For more information, see Basic system requirements on page 16.

# Supported data types — Oracle to Oracle

SharePlex supports the following Oracle data types for replication to Oracle targets. See the Conditions of suppport on page 24 for additional information.

- ANYDATA [1]

- B-FILE

- BINARY DOUBLE

- BINARY FLOAT

- BLOB [2]

- CHAR

- CLOB [2]

- DATE

- INTERVAL

- LONG RAW

- LONG [2]

- NCHAR

- NCLOB [3]

- NUMBER

- NVARCHAR2

- RAW

- ROWID

- SDO_GEOMETRY

- TIMESTAMP

- TIMESTAMP WITH LOCAL TIME ZONE

- TIMESTAMP WITH TIME ZONE

- UDT (User Defined Type)

- VARCHAR

- VARCHAR2

- VARRAY collectors [4]

- XMLTYPE [5]

# Conditions of suppport

### 1. Conditions of support - ANYDATA

- Replication of ANYDATA is supported, except when it contains a UDT or the storage is defined as SecureFile LOB with compression. SecureFile LOB without compression is supported. Only the following datatypes within ANYDATA are supported by SharePlex:

    - CHAR

    - DATE

    - NUMBER

    - RAW

    - VARCHAR

- VARCHAR2

- TIMESTAMP

- A datatype within an ANYDATA type must be in-row (inside the column data). Oracle encapsulates the ANYDATA type as an in-row securefile LOB. If the encapsulated data is longer than the length allowed for an in-row LOB, that data appears as out-of-row LOB data. SharePlex assumes that the encapsulated data always appears as in-row LOB.

## 2. Conditions of support - LONG and LOB (BLOB, CLOB)

- Any table that contains a LOB or LONG should have a primary key or unique key defined on it. If a table does not have a key, SharePlex builds its own key from all of the columns except LONGs or LOBs. If a LOB or LONG is the only difference between two rows that otherwise satisfy the Post WHERE clause, SharePlex cannot guarantee that the correct row will be updated.

- Replication of SecureFile LOBs (compressed high or medium, or uncompressed) is supported as follows:

  - Not supported if the storage specification includes encryption, and/or deduplication.

  - Logging must be enabled.

  - Replication to non-Oracle databases is supported except if the storage specification includes any level of compression, encryption, and/or deduplication. Logging must be enabled.

## 3. Conditions of support - NCLOB

NCLOBs are not supported by Compare/Repair if the source and target have different character sets.

## 4. Conditions of support - VARRAYS

Only the following data types in a VARRAY are supported by SharePlex when replicating to XML output:

- BINARY_FLOAT

- VARCHAR2

- BINARY_DOUBLE

- NUMBER

- TIMESTAMP (This is converted to a DATE data type without microseconds in XML output)

- DATE

- UDT (only if it contains one of the data types in this list)

## 5. Conditions of support - XMLTYPE

SharePlex supports the replication of XMLTYPE stored as CLOB and BINARY. SharePlex does not support XMLTYPE stored as OBJECT RELATIONAL. Additionally, the following applies:

- XMLTYPE stored as BINARY is not supported when storage is defined as SecureFile LOB with compression. SecureFile LOB without compression is supported.

- Binary XMLTypes are not supported by Compare/Repair when source and target character sets are different and require character set conversion.

- Compare/Repair does not support comparison of XMLTYPE when source and target have different storage clauses. Compare/Repair only supports compare/repair when source and target are both stored as BINARY or both are stored as CLOB.

**6. Conditions of support - general**

- When replicating DML operations to an Open Target database, SharePlex queries the target database to determine the target column definition before posting the data.

- If the precision or size of the target datatype is not large enough for the data being replicated, the data may be truncated or rounded by the database when applied.

# Supported data types — Oracle to Open Target

This section shows the following:

- The Oracle data types that SharePlex replicates to each supported Open Target target.

- The default mapping of those Oracle data types to their corresponding data types in the given target, for the purpose of establishing column definitions for replicated ADD COLUMN operations.

NOTES ABOUT OPEN TARGET DATA TYPE SUPPORT:

- For replicated DML, SharePlex queries the target database to determine the appropriate data type to use.

- If the precision or size of the target datatype is not large enough for the data being replicated, the data may be truncated or rounded by the database when applied.

- To view the DDL operations that SharePlex supports per database, see Supported Oracle DDL operations on page 33

## Oracle to HANA supported data types

| Oracle Data Type | Default mapping to HANA Data Type for DDL operations |
|---|---|
| BINARY_DOUBLE | double |
| BINARY_FLOAT | double |
| BLOB | blob |
| CHAR | char |
| CLOB | clob |
| DATE | date |
| LONG | clob |
| LONGRAW | blob |
| NCHAR | nchar |
| NCLOB | nclob |
| NUMBER | decimal |

| Oracle Data Type | Default mapping to HANA Data Type for DDL operations |
| --- | --- |
| NVARCHAR | nvarchar |
| RAW | varbinary |
| TIMESTAMP | timestamp |
| VARCHAR/VARCHAR2 | varchar |

**Conditions of support**

1. If the precision or size of the target datatype is not large enough for the data being replicated, the data may be truncated or rounded by the database when applied.

2. See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to MySQL supported data types

| Oracle Data Type | Default mapping to MySQL Data Type for DDL operations |
| --- | --- |
| BINARY_DOUBLE[2] | double |
| BINARY_FLOAT | double |
| BLOB | longblob |
| CHAR | char |
| CLOB | longtext |
| DATE | datetime |
| LONG | text |
| LONGRAW | blob |
| NUMBER | numeric |
| RAW | varbinary |
| TIMESTAMP[1] | datetime |
| VARCHAR(2) | varchar |

**Conditions of support**

1. If the MySQL target database is earlier than version 5.6.4, the fractional seconds will be truncated. Earlier versions did not support fractional seconds.

2. Because Oracle and MySQL handle this data type differently, there may be a very small difference in precision between the value of the source and the value of the target row. You may see the difference when viewing the data from SQL*Plus or other utility, but SharePlex will not report this difference as an out-of-sync condition.

3. See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to PostgreSQL supported data types

| Oracle Data Type | Default mapping to PostgreSQL Data Type for DDL operations |
|---|---|
| BINARY_DOUBLE | double precision |
| BINARY_FLOAT [1] | double precision |
| CHAR | char |
| CLOB | text |
| DATE | date |
| LONG | text |
| NCHAR | char |
| NCLOB | text |
| NUMBER | numeric |
| NVARCHAR | varchar |
| TIMESTAMP | timestamp |
| VARCHAR(2) | varchar |

**Conditions of support**

1. The Oracle BINARY_FLOAT and PostgreSQL double precision data types have different precision. Make certain the source and target lengths are compatible. Numbers of 18801973500000000000 or larger can result in out-of-sync errors.

2. See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to SAP ASE supported data types

| Oracle Data Type | Mapped to SAP ASE Data Type |
|---|---|
| BINARY_DOUBLE | float |
| BINARY_FLOAT | float |
| BLOB | image |
| CHAR | char |
| CLOB | text |
| DATE | datetime |
| LONG | text |
| LONGRAW | image |

| Oracle Data Type | Mapped to SAP ASE Data Type |
|---|---|
| NUMBER | numeric |
| RAW | varbinary |
| VARCHAR(2) | varchar |

**Conditions of support**

See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to SQL Server supported data types

| Oracle Data Type | Default mapping to SQL Server Data Type for DDL operations |
|---|---|
| ANYDATA | sql_variant |
| BINARY_DOUBLE | float |
| BINARY_FLOAT | float |
| BLOB | image |
| CHAR | char |
| CLOB | text |
| DATE | datetime2 |
| LONG | text |
| LONGRAW | image |
| NCHAR | nchar |
| NCLOB | ntext |
| NUMBER | numeric |
| NVARCHAR | nvarchar |
| RAW | varbinary |
| TIMESTAMP WITH TIME ZONE | datetimeoffset |
| TIMESTAMP | datetime2 |
| VARCHAR(2) | varchar |

**Conditions of support**

See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to Sybase supported data types

| Oracle Data Type | Default mapping to Sybase Data Type for DDL operations |
|---|---|
| BINARY_DOUBLE | float |
| BINARY_FLOAT | float |
| BLOB | image |
| CHAR | char |
| CLOB | text |
| DATE | datetime |
| LONG | text |
| LONGRAW | image |
| NUMBER | numeric |
| RAW | varbinary |
| VARCHAR(2) | varchar |

**Conditions of support**

See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to Teradata supported data types

| Oracle Data Type | Default mapping to Teradata Data Type for DDL operations |
|---|---|
| CHAR | char |
| DATE | timestamp |
| NUMBER | number |
| VARCHAR/VARCHAR2 | varchar |

**Conditions of support**

See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Oracle to XML supported data types

This mapping applies to all targets that receive messages as XML:

- File in XML format

- JMS

- Kafka

| Oracle Data Type | Default mapping to XML Data Type for DDL operations |
|---|---|
| BLOB | base64Binary |
| CHAR | string |
| CLOB | string |
| DATE | dateTime |
| BINARY_FLOAT | decimal |
| BINARY_DOUBLE | decimal |
| INTERVAL DAY TO SECOND | dayTimeDuration |
| INTERVAL YEAR TO MONTH | yearMonthDuration |
| LONG | string |
| NCHAR | string |
| NCLOB | string |
| NUMBER | decimal |
| NVARCHAR2 | string |
| RAW | base64Binary |
| ROWID | string |
| TIMESTAMP | dateTime |
| TIMESTAMP WITH TIME ZONE | dateTimeStamp |
| TIMESTAMP WITH LOCAL TIME ZONE | dateTimeStamp |
| VARCHAR2 | string |
| VARRAY [1] | Post maps the data types in the source VARRAY to the appropriate XML data types. Only certain data types in a VARRAY are supported. See the conditions of support. |

## Conditions of support

1. Only the following data types in a VARRAY are supported by SharePlex when replicating to XML output:

   - BINARY_FLOAT

   - VARCHAR2

   - BINARY_DOUBLE

   - NUMBER

   - TIMESTAMP (This is converted to a DATE data type without microseconds in XML output)

- DATE
- UDT (only if it contains one of the data types in this list)

2. See Supported data types — Oracle to Oracle on page 23 for additional conditions of support for Oracle source data types.

# Supported Oracle DML operations and objects

SharePlex supports DML replication from the following Oracle objects:

- Any table can be replicated to an Oracle or non-Oracle target if the target supports all of the column types that are being replicated. This includes:
    - index-organized tables
    - partitioned tables
    - views
    - materialized views.

- Oracle sequences can be replicated from Oracle to Oracle. Replication of sequences is not supported to a non-Oracle target. IMPORTANT! To replicate sequences, the supplemental logging of primary and unique keys must be enabled at the database level, or you must enable supplemental logging for primary keys on the **sys.seq$** table.

- Replication to targets with a different character set is supported, with limitations. When posting to Open Target databases, XML files and JMS, SharePlex supports only UNICODE and US7ASCII on the target, but conversion can be performed by an Oracle client installed on the target system. For full details, see the Database section of the Preinstallation Checklist.

NOTES:

- SharePlex only replicates DML changes that are made to Oracle source objects that are listed in the configuration file.
- SharePlex replicates changes to those objects only when they appear in Oracle redo log files.

The following table summarizes SharePlex DML support.

| DML support | Supported for |
| --- | --- |
| INSERT, UPDATE, DELETE, COMMIT, ROLLBACK on tables | All target types |
| Direct-path loads (SQL*Loader) (INSERT AND FULL ROLLBACK) | All target types |
| DML on tables encrypted by Oracle Obfuscation Toolkit | All target types |
| DML on tables with TDE encryption[1] | All target types except Oracle 10g and 11gR1 |
| DML on Oracle Label Security (OLS)[2] | All target types |

| DML support | Supported for |
|---|---|
| DML on compressed objects: Basic, OLTP, HCC[3] | All target types |
| Direct Load (DLOAD) on compressed objects: Basic, OLTP, HCC[3] | All target types |

### 1. Conditions of support - TDE

- SharePlex supports Tablespace Encryption and Column Encryption for Oracle 11g R2 and later versions, both source and target.
- The SharePlex **copy/append** command does not support TDE.

### 2. Conditions of support - OLS

By default, SharePlex cannot process rows that are protected by OLS because users granted DBA privileges (like SharePlex) do not have enough privileges to access those rows. However, if privilege is granted from the OLSSYS user, SharePlex can support OLS. SharePlex was tested under the following OLS configuration:

- The SharePlex user was granted full privilege to the objects in replication.
- Test tables with OLS security were created.
- Data was replicated using INSERT/UPDATE/DELETE/ROLLBACK/TRUNCATE, and ALTER TABLE to add and drop columns.

NOTE: If the OLS policy data label column is defined as hidden, the data in that column cannot be replicated by SharePlex.

### 3. Conditions of support - compression

Under certain conditions, Oracle does not provide enough information in the redo log for SharePlex to replicate a DML operation on a compressed object.

# Supported Oracle DDL operations

SharePlex provides default and optional DDL support.
NOTES:

- SharePlex supports DDL on compressed objects only for Oracle 11gR2 and later source databases.
- ALTER TABLE to ADD COLUMN and ALTER TABLE to DROP COLUMN are supported on compressed source objects (Basic, OLTP, HCC) for all Oracle and Open Target targets.
- All other DDL on compressed source objects is supported ONLY for Oracle 11g and later targets.
- Any object or operation not listed in one of the tables in this section is not supported for that feature.

# Default DDL support for objects in replication

This section shows the default DDL support for objects that are *included in the active replication configuration* either explicitly or with a wildcard.

# Oracle-to-Oracle default DDL support

The default Oracle-to-Oracle DDL configuration is controlled by the following parameter settings:

SP_OCT_REPLICATE_DDL=3 and

SP_OCT_AUTOADD_ENABLE=1 and

SP_OCT_REPLICATE_ALL_DDL=0

| Supported object | Supported Operation |
|---|---|
| Table and IOT | Create table[1] |
| | Create table as select[1, 4] |
| | Drop table[1] |
| | Create index[1] |
| | Drop index[1] |
| | Truncate[2] |
| | Alter table add column[2] |
| | Alter table drop column [2] |
| | Comment on table[2] |
| | Comment on columns[2] |
| | Associate Statistics[2] |
| | Disassociate Statistics[2] |
| Partition/ Subpartition[2, 3] | Add |
| | Split |
| | Merge |
| | Drop |
| | Modify |
| | Coalesce |
| | Exchange |
| | Move |
| | Truncate |
| | Rename |
| | Set |
| Index[1] | Create |
| | Alter |
| | Drop |

## Conditions of support

1. Enabled by default through SP_OCT_AUTOADD_ENABLE=1. Auto-Add automatically adds an object to replication if the name satisfies a wildcard in the active replication configuration.

2. Enabled by default through SP_OCT_REPLICATE_DDL=3. This is the default DDL support for objects that are listed in the active configuration.

3. The full default DDL support applies to user-named interval partitions/subpartitions. For system-named (system generated) interval partitions/subpartitions, SharePlex supports only ALTER TABLE to DROP and TRUNCATE the system-named partitions. If the database is earlier than Oracle 12.2, to enable support for DROP and TRUNCATE of system-named partitions, set the SP_OCT_TRUNC_PARTITION_BY_ID parameter to 1, and ensure that both source and target are updated to SharePlex version 8.6.4 or later. This is not required for Oracle 12.2 or later and any setting is ignored.

NOTE: SharePlex does not support TRUNCATE of a system-generated sub-partition if the sub-partition is empty, and Post stops with error SP-OPO01002. To configure Post to ignore this error, set the SP_OPO_ CONT_ON_ERR parameter to 1 and add error number SP-OPO01002 to the top of the **oramsglist** file, before you restart Post.

4. For CREATE TABLE AS SELECT, SharePlex supports the following datatypes: LONG, DATE, RAW, LONG RAW, ROWID, LONG VARCHAR, CHAR, CLOB, BLOB, CFILE, BFILE, TIMESTAMP, INTERVAL YEAR TO MONTH, INTERVAL DAY TO SECOND and ANYDATA.

# Oracle-to-Open Target default DDL support

This section shows the default DDL support for Oracle objects when replicated to an Open Target, when the objects are *included in the active replication configuration* either explicitly or with a wildcard.

SharePlex only supports replication of TRUNCATE TABLE and ALTER TABLE to ADD COLUMN or DROP COLUMN to an Open Target database, file, or message container. No other DDL is supported to Open Target.

The default Oracle to Open Target configuration is controlled by the following parameters:

>   SP_OCT_REPLICATE_DDL=3 and
>   SP_OCT_AUTOADD_ENABLE=1 and
>   SP_OCT_REPLICATE_ALL_DDL=0

| Supported object | Supported Operation |
|---|---|
| Table and IOT | Truncate[1] |
| | Alter table add column[2] |
| | Alter table drop column |

### 1. Conditions of support - TRUNCATE TABLE

TRUNCATE TABLE is not supported from Oracle compressed objects to Open Target targets.

### 2. Conditions of support - data type mappings

The default mappings of Oracle data types to their Open Target counterpart for replicated ALTER TABLE ADD COLUMN DDL is shown in Supported data types — Oracle to Oracle on page 23. When SharePlex adds the column, it defines it with the default data type. This mapping applies to the entire configuration (not per table).

NOTE: These mappings are only used to establish column definitions for replicated ADD COLUMN operations. For replicated DML, SharePlex queries the target database to determine the appropriate data type to use.

- To view the default datatype mapping, use the **target** command with the **show datatype** option in **sp_ctrl**.

- To modify a mapping, use the **target** command with the **set datatype** option. SharePlex does not validate the accuracy of a custom mapping and Quest cannot be held responsible for any inaccuracies resulting from custom mappings. For syntax, use the **help** command in **sp_ctrl** or see the **target** command in the SharePlex Reference Guide.

# Optional DDL support for objects in replication

**Valid only for Oracle-to_Oracle replication**

You can enable the replication of the following DDL with parameter settings *when it is issued on objects that are in the configuration file*.

| DDL command | Parameter |
|---|---|
| CREATE / DROP TRIGGER | SP_OCT_REPLICATE_TRIGGER=1 |
| CREATE / DROP SYNONYM | SP_OCT_REPLICATE_SYNONYM=1 |
| GRANT | SP_OCT_REPLICATE_GRANT=1 |

# Optional Auto-Add support for objects in replication

**Valid only for Oracle-to_Oracle replication**

Optional Auto-Add support enables newly created **materialized views** and **sequences** to be added to replication automatically if the name of the object satisfies a wildcard *in the active configuration file*. It is configured as follows:

**Materialized Views:**

SP_OCT_AUTOADD_ENABLE=1 and

SP_OCT_AUTOADD_MV=1 and

SP_SYS_TARGET_COMPATIBILITY=8.6.2 or higher

**Sequences:**

SP_OCT_AUTOADD_ENABLE=1 and

SP_OCT_AUTOADD_SEQ=1 and

SP_SYS_TARGET_COMPATIBILITY=8.6.3 or higher

**NOTES:**

- Not supported for Open Target.

- For CREATE MATERIALIZED VIEW, SharePlex supports the following datatypes: LONG, DATE, RAW, LONG RAW, ROWID, LONG VARCHAR, CHAR, CLOB, BLOB, CFILE, BFILE, TIMESTAMP, INTERVAL YEAR TO MONTH, INTERVAL DAY TO SECOND and ANYDATA. SharePlex does not support ALTER MATERIALIZE VIEW.

- SharePlex does not replicate materialized views to materialized views. SharePlex converts a CREATE MATERIALIZED VIEW to a CREATE TABLE, applies the CREATE TABLE to the target, and then replicates the DML that populates the view.

- To replicate sequences, the supplemental logging of primary and unique keys must be enabled at the database level, or you must enable supplemental logging for primary keys on the **sys.seq$** table.

# Expanded DDL support for objects not in replication

DDL support for objects *not listed in the configuration file* is valid only for Oracle-to-Oracle replication. SharePlex replicates the DDL statements, but does not replicate any data change operations made to the objects because they are not part of active replication. The expanded DDL configuration is controlled by the following parameter setting:

    SP_OCT_REPLICATE_ALL_DDL=1

**NOTES:**

- Any object or operation not listed is not supported.

- Expanded DDL replication supports not only tables and sequences but also a wide range of other objects such as procedures, functions, users, and views, which are not part of replication. Some of these objects may have underlying objects that *are in replication*. In those cases, Expanded DDL replication applies to the underlying objects in replication, as well as to the object that is not in replication.

| Supported object | Supported Operation |
| --- | --- |
| Table and IOT | Create table |
| | Create table as select |
| | Alter table add column |
| | Alter table drop column |
| | Drop table |
| | Truncate |
| | Comment on table |
| | Comment on columns |
| | Associate Statistics |
| | Disassociate Statistics |
| Cluster | Create cluster |
| | Crop cluster |
| Sequence | Create |
| | Drop |
| | Alter |

| Supported object | Supported Operation |
| --- | --- |
| Partition/ Subpartition | Add |
| | Split |
| | Merge |
| | Drop |
| | Modify |
| | Coalesce |
| | Exchange |
| | Move |
| | Truncate |
| | Rename |
| | Set |
| Index | Create |
| | Alter |
| | Drop |
| View | Create |
| | Alter |
| | Drop |
| | Comment on view |
| Synonym | Create |
| | Drop |
| Directory | Create |
| | Drop |
| User-defined type | Create type |
| | Alter type |
| | Drop type |
| | Create type body |
| | Drop type body |
| Stored procedure | Create |
| | Alter |
| | Drop |
| Stored function | Create |
| | Alter |
| | Drop |

| Supported object | Supported Operation |
| --- | --- |
| Package | Create package |
| | Create package body |
| | Alter package |
| | Alter package body |
| | Drop package |
| | Drop package body |
| User | Create user |
| | Alter user |
| | Drop user |
| | Grant |
| | Revoke |
| Role | Create role |
| | Alter role |
| | Drop role |
| | Grant |
| | Revoke |

# Non-supported items for Oracle Database

This is a list of commonly used Oracle components that SharePlex does not replicate. Since both Oracle and SharePlex continually change and improve, this list of exclusions cannot be considered complete. Unless explicitly stated that an item is supported, you should assume that SharePlex does not replicate it.

| Object/operation/feature | Not supported |
|---|---|
| Tables and Objects | Replication of nested tables |
| | Replication of clustered tables |
| | Replication of Index-Organized Tables with any of the following:<br><br>• LOB columns<br><br>• VARRAY columns |
| | Replication from a Non-IOT to an IOT table |
| | Replication from materialized views to materialized views. (However, SharePlex replicates the underlying table of a materialized view to a target table.) |
| | Replication of Identity columns |
| DDL operations | ANALYZE TABLE and ANALYZE INDEX |
| | DDL operation performed by a SharePlex Oracle user, if SP_OCT_REPLICATE_ALL_DDL is set to [1] |
| | DDL to ALTER TABLE ADD OVERFLOW to an IOT in replication |
| Oracle operations | Operations that do not appear in the redo logs. This includes any DML or DDL not in the redo logs, and also PL/SQL packages which do not write results to the redo logs, for example, dbms_shared_pool.keep and related packages. |
| | Replication of partial rollbacks of DLOADs |
| | Rows changed by 'UPDATE WITH CASE' syntax |
| SharePlex transformation and conflict resolution | LONG and LONG_RAW datatypes in a configuration where transformation or conflict resolution are performed |
| | Abstract datatypes and VARRAYs in a configuration where conflict resolution is performed |
| SharePlex horizontal partitioning | SharePlex horizontal partitioning of index-organized tables |
| dbms_lob operations to non-Oracle targets | Replication of LOB operations generated by **dbms_lob** are not supported when replicating to non-Oracle targets. |
| dbms_scheduler.create_job | This object is not supported. |
| Flashback | SharePlex does not support the Oracle Flashback Table feature. If the SP_REPLICATE_ALL_DDL parameter is enabled (value of 1), SharePlex may try to replicate the flashback DDL, which will return an error. To perform Flashback Table on a table that is in replication, use the following procedures in the SharePlex Administrator Guide to work around this issue:<br><br>1. Remove source objects from replication<br><br>2. Perform the flashback<br><br>3. Add or change objects in an active configuration |
| Other | Replication of rows in which data exceeds 319 KB in size, excluding LOB and LONG columns |

# Supported SharePlex featues — Oracle to Open Target

The following table shows whether specific SharePlex features are supported for Open Target targets.

| SharePlex feature | Supported for Open Target | Not Supported for Open Target |
|---|---|---|
| reconcile command (target instantiation) | X | |
| compare/compare using and repair/repair using commands | | X |
| copy/copy using and append/append using commands | | X |
| Hash horizontally partitioned replication | | X |
| Column-based horizontally partitioned replication | X (except Teradata) | |
| Vertically partitioned replication | X | |
| Column mapping | X | |
| Key definition | X | |
| Build configuration with scripts | | X |
| Named queues | X | |
| Commit Reduction (feature of Post Enhanced Performance) | X | |
| Dependency Checking (feature of Post Enhanced Performance) | | X |
| Transformation | | X |
| Conflict resolution | | X |
| Peer-to-peer replication (bi-directional) | | X |
| Consolidated replication (many to one) | X | |
| Broadcast replication (one to many) | X | |
| High availability replication (active/passive bi-directional) | | X |
| Change tracking target (CDC) | | X |
| Data encryption | X | |
| Data compression | X | |
| SSH | X | |
| auth_hosts file | X | |
| Monitoring scripts | X | |

| SharePlex feature | Supported for Open Target | Not Supported for Open Target |
|---|---|---|
| SNMP monitoring | X | |
| Continue posting on error (SP_OPX_CONT_ON_ERR) | X | |
| Suspend on out of sync errors (SP_OPX_OUT_OF_SYNC_SUSPEND) | X | |
| Reduced key (SP_OPX_REDUCED_KEY) | X | |
| Logical Transaction Rollback on out-of-sync transactions | | X |

# System Requirements — SQL Server Capture

This section contains information about SharePlex support for capture from a SQL Server source database and replication to supported targets.

SharePlex support for SQL Server as a target for Oracle data is documented in System Requirements — Oracle on page 20.

## Supported versions and targets

SharePlex supports Capture for SQL Server versions 2012, 2014, and 2016 on Windows 2012 R2.

| Source | Target - Platform/Database |
| --- | --- |
| **Windows 2012 R2 on-premise** | **Windows 2012 R2 on-premise** |
| SQL Server 2012 | SQL Server 2012 |
| SQL Server 2014 | SQL Server 2014 |
| SQL Server 2016 | SQL Server 2016 |
| | Oracle 11.2 |
| | Oracle 12.1 |
| | **Linux RHEL 5.5 on-premise** |
| | Oracle 11.2 |
| | **Linux RHEL 6.3 on-premise** |
| | Oracle 12.1 |
| | **Solaris SPARC 11 on-premise** |
| | Oracle 11.2 |
| | **Azure Windows 2012 R2 (IaaS)** |

| Source | Target - Platform/Database |
|---|---|
| | SQL Server 2012 |
| | SQL Server 2014 |
| | SQL Server 2016 |
| | **Azure SQL Database (PaaS)** |
| | SQL Server 2012 |
| | SQL Server 2014 |
| | **AWS Linux EC2 (IaaS)** |
| | SQL Server |
| | Oracle |
| | **AWS Linux RDS (PaaS)** |
| | SQL Server |
| | Oracle |

# Conditions of support

This section shows the limitations of capturing from a SQL Server source.

- SQL Server native replication and SharePlex replication cannot be used at the same time for the same database.
- All SQL Server tables in the SharePlex replication configuration must be defined in the database with a primary key. A SharePlex key definition is not sufficient, nor can SharePlex use all columns as a key. You can use SharePlex filtering features in the configuration file to omit tables that do not have a primary key.
- A transaction must COMMIT to the SQL Server source before it can be captured by SharePlex.
- See the SharePlex Installation Guide for additional requirements and setup information.

# Supported DML operations

SharePlex supports INSERT, UPDATE, and DELETE operations between SQL Server source tables and Oracle or SQL Server target tables.

Any SQL Server table can be replicated to an Oracle or SQL Server target if the target supports all of the column types that are being replicated.

NOTES:

SharePlex only replicates DML changes that are made to SQL Server source objects that are listed in the configuration file.

SharePlex requires SQL Server Replication to be installed on the source system. See the *SharePlex Installation Guide* for more information.

# Supported DDL operations

SharePlex does not support the replication of SQL Server DDL operations.

# Supported data types

SharePlex supports DML operations that contain the following SQL Server data types:

- int
- numeric
- smallint
- tinyint
- float
- real
- date
- datetime
- datetime2
- datetimeoffset
- smalldatetime
- time
- char
- text
- varchar
- nchar
- ntext
- nvarchar
- binary
- varbinary
- image
- identity

**NOTE:** When replicating to an Oracle target, SharePlex queries the target database to determine the appropriate data type to use.

# Supported SharePlex features — SQL Server to supported target

The following table shows whether or not SharePlex features are supported when SQL Server is the source.

| SharePlex feature | Supported with SQL Server Target | Supported with Oracle Target |
| --- | --- | --- |
| Replication between tables in same database | No | No |
| Replication between tables in different databases in the same or another SQL Server instance | Yes | Yes |
| Replication from SQL Server tables to any target where the version of SharePlex is earlier than 9.0. | No | No |
| Auto-add of new tables that satisfy a wildcard | No | No |
| flush command | Yes | Yes |
| reconcile command (target instantiation) | Yes | Yes |
| compare/compare using and repair/repair using commands | No | No |
| copy/copy using and append/append using commands | No | No |
| Hash horizontally partitioned replication | No | No |
| Column-based horizontally partitioned replication | No | No |
| Vertically partitioned replication | Yes | Yes |
| Column mapping | Yes | Yes |
| Key definition (SQL Server tables must have a defined key) | No | No |
| Build configuration with scripts | No | No |
| Named queues | Yes | Yes |
| Post Enhanced Performance | No | No |
| Transformation | No | Yes |
| Conflict resolution | No | Yes |
| Peer-to-peer replication (bi-directional) | No | No |
| Consolidated replication (many to one) | Yes | Yes |
| Broadcast replication (one to many) | Yes | Yes |
| Cascading replication (source-intermediary- | Yes | Yes |

| SharePlex feature | Supported with SQL Server Target | Supported with Oracle Target |
|---|---|---|
| target) | | |
| High availability replication (active/passive bi-directional) | No | No |
| Change history target (CDC) | No | Yes |
| Data encryption | No | No |
| Data compression | No | No |
| SSH | No | No |
| auth_hosts file | No | No |
| Monitoring scripts | No | No |
| SNMP monitoring | No | No |
| Continue posting on error (SP_OPX_CONT_ON_ERR) | Yes | Yes |
| Suspend on out of sync errors (SP_OPX_OUT_OF_SYNC_SUSPEND) | Yes | Yes |
| Reduced key (SP_OPX_REDUCED_KEY) | Yes | Yes |
| sp_ctrl commands | See the command documentation in the Reference Guide. | See the command documentation in the Reference Guide. |
| Logical Transaction Rollback on out-of-sync transactions | No | Yes |

# Known issues in this release

The following is a list of issues, including those attributed to third-party products, known to exist at the time of release.

## SQL Server capture known issue

If the source SQL Server version is 2012 and below, SharePlex will re-capture transactions that were already been processed if SharePlex is shut down ungracefully, either intentionally with a kill command or due to system failure. This results in double-posting on the target and resultant unique-constraint errors. To avoid these errors, always shut down SharePlex gracefully with the shutdown command in **sp_ctrl** before you shut down or reboot a system.

## General known issues

| Known Issue | Issue ID |
|---|---|
| The reported core file was not generated on systems running Oracle 11g on the SunOS, AIX, HP-UX (PA-RISC and IA64), and Linux platforms. | 66306 |
| If the customer issues an "ALTER TABLE ... MOVE COMPRESS" DDL command against a table in replication, SharePlex will replicate the DDL to the target by default. After post issues the DDL, if the target table had indexes, they are now unusable and post will subsequently fail trying to apply changes to the table. If post gets an error on the table such as "ORA-01502: index XXX or partition of such index is in unusable state" , the user must rebuild any indexes the table may have before restarting post in order to rectify the situation. | N/A |

## Install Upgrade known issues

| Known Issue | Issue ID |
|---|---|
| A memory fault (core dump) was encountered during the "Setting file ownerships" section of the SharePlex installation on HP-UX PA-RISC. | 71355 |

## Windows known issues

| Known Issue | Issue ID |
|---|---|
| On Windows systems, the uninstaller does not prompt for the version of SharePlex to be removed from a system. When there are multiple versions of SharePlex installed on a system, it removes only the first installation. | N/A |

| Known Issue | Issue ID |
|---|---|
| In the Windows environment, always run sp_ctrl from the same drive on which you have installed SharePlex. If you run sp_ctrl from another drive, you will be prompted for a login ID and password. After you provide the login ID and password, sp_ctrl will run normally. | N/A |
| If the user wants to change the installation directory for a given port, the user must first uninstall from the previous location. Note that if the user wants to keep the previous VARDIR it should be copied to the new location prior to the uninstall. | 62620 |

## ASM known issues

| Known Issue | Issue ID |
|---|---|
| If the redo_log or archive_log that SharePlex is currently reading is involved in "rebalancing" due to the removal of a disc group, the Capture process will pause until the rebalance procedure for that file is complete. | N/A |
| On raw device ASM systems, the sp_desvr may get stuck and the process can not be killed even when kill -9 is issued; users must reboot the system to recover from it. | 61713 |

## Startup known issues

| Known Issue | Issue ID |
|---|---|
| If you have SharePlex configured to start from a startup script and it returns an error similar to: System call error: sp_cnc (connecting from cdrpx.mcit.med.umich.edu) Bad file number Can't dup2 stderr try adding nohup to your script. The nohup command directs a command (in this case the startup of SharePlex) to continue in the background after the current user (the script) logs out. The syntax is:<br><br>`cd /product_directory/bin`<br><br>`nohup ./sp_cop &` | N/A |

## Character Sets known issues

| Known Issue | Issue ID |
|---|---|
| Avoid replicating NCHAR datatypes using different character sets such as AL16UTF16 on the source machine and UTF8 on the target due to byte size limitations. Oracle stores NCHAR data with a maximum limit of 2000 bytes. A fixed length NCHAR character set such as AL16UTF16 has a different maximum number of characters than a variable length NCHAR character set such as UTF8. For the fixed length AL16UTF16 character set, each character is stored as 2 bytes; thus, the maximum number of characters is 1000 for NCHAR data. For the variable length UTF8 character set, the maximum number of characters a column can accommodate depends on how many bytes each character requires. If you replicate 1000 3-byte characters from a source machine using the AL16UTF16 character set to a target | 35198 |

| Known Issue | Issue ID |
|---|---|
| machine set to UTF8, you will get the following Oracle error message on the target, since it needs 3000 bytes:<br><br>`ORA-01461 can bind a LONG value only for insert into a LONG column` | |

## copy/append known issues

| Known Issue | Issue ID |
|---|---|
| If you need to copy a materialized view to a table, you should drop the target table before copying. Please be aware that the new target table created by copy will have an additional column named M_ROW$$ which does not exist on the source. The use of append on a materialized view to a table is not supported. | 41679 |

## Conflict Resolution known issues

| Known Issue | Issue ID |
|---|---|
| The !ControlExtendedCharSet prepared conflict resolution routine and the !DEFAULT parameter currently cannot be used for generic conflict resolution. | N/A |

## Partitioned Replication known issues

| Known Issue | Issue ID |
|---|---|
| A 30-character partition name in the PARTITION_SCHEME column of the SHAREPLEX_ PARTITION table causes the activate config command to fail, even though the column definition allows 30 characters. | N/A |
| When using a compound routing map in a placeholder route in the configuration file, do not use spaces between each routing component. For example, sysb@o.orab+sysc@o.oraC is correct because there are no spaces before or after the + symbol. | N/A |

## Vertical and Horizontal Partitioning known issues

| Known Issue | Issue ID |
|---|---|
| When using horizontal partition replication with DATE datatype in the column condition, the DATE needs to follow the SP date string format, 'MMDDSYYYYHH24MISS'. Otherwise, the Read and Compare processes are not able to process it. | 55268 |

## LOBs, VARRAYs, and XML known issues

| Known Issue | Issue ID |
|---|---|
| Users may encounter an out-of-sync condition when an UPDATE occurs on a table that contains a UDT with a VARRAY column, and there is no KEY on the table. This issue is specific to Solaris x86 platforms. | 29650 |

## DDL Replication known issues

| Known Issue | Issue ID |
|---|---|
| Replicating CREATE ROLE (set param SP_OCT_REPLICATE_ALL_DDL 1) is changing the grantee name on the target to the name of the SharePlex Administrator. | 2242 |
| If the Capture process is behind in reading the Oracle redo or archive logs when the SP_OCT_ REPLICATE_ALL_DDL parameter is enabled it will replicate DDLs whose time stamps precede this event. | 56957 |

## Partition DDL known issues

| Known Issue | Issue ID |
|---|---|
| If separate SQL statements for partition DDL and index rebuild are run on the source, SharePlex only replicates the partition DDL and leaves target global index unusable. This is because ALTER INDEX is not supported by SharePlex. The recommended work around is that all partition DDLs which mark global indexes as unusable should be run with an appending clause UPDATE GLOBAL INDEXES to the ALTER TABLE SQL statements. The alternative is to manually rebuild the global indexes on target. | 57939 |

## ora_cleansp known issues

| Known Issue | Issue ID |
|---|---|
| On HP-Itanium systems, you might see the following warning when running ora_cleansp:<br><br>`Warning: Ignoring setuid/setgid bit on "./ora_cleansp" as the system tunable "secure_sid_scripts" is set.`<br><br>This occurs when ora_cleansp is run by a user who is not the owner of ora_cleansp and when secure_sid_scripts, a system tunable parameter, is set. This condition is harmless to ora_ cleansp and you should ignore the warning. | NA |

### Function based index known issues

| Known Issue | Issue ID |
|---|---|
| If there is more than one function defined in the index, SharePlex will choose the first. SharePlex cannot support multiple functions. | 92931 |

### Post to JMS known issues

| Known Issue | Issue ID |
|---|---|
| If the post process that is writing to JMS is not on the same machine as the source database, and if the two machines are of different endianness, NCHAR data will not be written to JMS correctly. | 107471 |

### Hybrid Columnnar Compression known issues

| Known Issue | Issue ID |
|---|---|
| Activation will not fail if a table with "COMPRESS FOR QUERY LOW" compression is activated. Capture will log a message indicating that "COMPRESS FOR QUERY LOW" is not supported | 107487 |

# Third-party known issues

### Third-party known issues: Linux

| Known Issue | Issue ID |
|---|---|
| RHEL with Oracle 10g or 11g may encounter issues when producing core files. To work around this issue users will need to change the parameter "core_pattern" in the /proc/sys/kernel/core_pattern file. The following command enables core files: sysctl -w kernel.core_pattern=core. The original setting is: /corefiles/core. In this state, the system looks for a directory named /corefiles, which does not exist, therefore a core file could not be created. | 54799 |

### Third-party known issues: Oracle

| Known Issue | Issue ID |
|---|---|
| Oracle may allow an invalid date, such as year 0000, to be inserted as the key value of a table without generating an error. This causes SharePlex to return an "Invalid DATE format detected in record with rowid" error when trying to insert the record to the target. | SPO-1368 |

| Known Issue | Issue ID |
|---|---|
| There might be an issue when replicating VARRAYs with FLOAT(n) type to a target machine running Oracle 10g, due to the way that Oracle handles Float(n) types. Float is not an Oracle type; it is a SQL-92 type and Oracle is not consistent in the way that it handles the float type. This is a known Oracle bug. See Oracle bug report 4266304. | 125639 |
| Users wishing to employ IOTs with overflow need to be running Oracle 10.2.0.3 or higher. This is a known Oracle issue addressed under Oracle Bug 4627859. | 44626 |
| There is a known issue with INSERT DIRECT LOAD VALUES (IDLV) in Oracle 11g that prevents the reading or modification of an object after modifying it in parallel. Oracle has provided three (3) solutions for addressing this issue. They can be found in the Oracle update of SR6849411.993 dated 05-07-2008. This issue was fixed by Oracle in 11gR2 | 53701 |
| Oracle versions 10.2.0.1 through 11.1.0.6 on AIX 5.3 (64 bit), members of SharePlex Admin group, other than the installation user, cannot run ora_setup or start SharePlex. This is an Oracle issue. Please refer to Oracle Bug# 6800649 and apply Patch 6800649. | 59258 |
| On Windows systems, the Post process May exit when it encounters an "ORA-07445: exception encountered: core dump" error. Please refer to Oracle Bug 6658912 for more information and the Oracle provided work around. | 67441 |
| Oracle 11gR2 - During a SYNC job, the copy of a new table (without data) failed at " EXP-00011: table does not exist" . The table that failed is a new table without any data. The EXP-00011 is caused by 11gR2 new feature "Deferred Segment Creation" that is controlled by the initialization parameter DEFERRED_SEGMENT_CREATION. The default is ON. To avoid this error, disable the parameter. A tar has been opened with Oracle and Oracle created a note 960216.1 Original Export Raises EXP-11 Table Does Not Exist. | 75179 |
| OLTP compression with supplemental logging enabled may corrupt the Oracle Undo block, so Oracle suggests disabling supplemental logging when running OLTP compression. However, SharePlex requires supplemental logging to be enabled, so you may encounter this bug. This affects Oracle versions 11.2.0.2, 11.2.0.1 and 11.1.0.7. See Metalink ID 1191474.1. | 92152 |
| Sometimes the Post process will hang updating a SecureFile LOB. For more information please refer to Oracle tar SR 3-2898230851: OCILobWrite hangs at the OCI_LAST_PIECE for securefile LOB. | N/A |
| There is an Oracle bug that can cause the database to crash when supplemental logging is enabled and transactions involving tables in a compressed tablespace are rolled back. Please refer to Oracle bug 8331063 for more information. | N/A |
| A known issue in PL/SQL prevents the SharePlex conflict resolution logic from compiling the PL/SQL for tables whose names are the same as their owners. Oracle has stated that the issue will not be fixed. See Oracle TAR 2577886.996 for more information. This issue does not affect replication; SharePlex supports tables with identical owner and table names. | N/A |

# Licensing

The current license model for SharePlex is to license for a specific host, which depending on edition is licensed by core(s) or socket(s) and specific message repository (i.e. database, JMS/text files) etc. Specifics of license terms should be obtained from your account manager.

### *To activate a trial license*

1. Run the SharePlex command:

   **./splex_add_key**

   ```
   SharePlex License Utility
   1) Read license key from file
   2) Enter license key manually
   3) Add license key for alternate host
   q) Quit License Utility
   Enter option:
   ```

2. Enter option 2.

3. Enter the key provided in the email from Quest Licensing.

4. For the customer name, enter: Trial Version.

### *To activate a purchased commercial license*

1. Run the SharePlex command:

   **./splex_add_key**

   ```
   SharePlex License Utility
   1) Read license key from file
   2) Enter license key manually
   3) Add license key for alternate host
   q) Quit License Utility
   Enter option:
   ```

2. Enter option 2.

3. Enter the key provided in the email from Quest Licensing.

4. Enter the customer name provided in that email.

# Third Party Contributions in this release

This product contains the following third-party components. For third-party license information, go to https://www.quest.com/legal/license-agreements.aspx. Source code for components marked with an asterisk (*) is available at https://opensource.quest.com.

**Table 1: List of Third-Party Contributions**

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| --- | --- |
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