

SAP Replication Server® Options 15.7.1 SP204  
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## New Features Guide



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# 1 New Features in Replication Server Options 15.7.1 SP204

Learn about the new features in SAP® Replication Server® Options 15.7.1 SP204 and its component, Replication Agent™.

## 1.1 New Features in Replication Agent for Oracle in SP204

Replication Agent includes several new enhancements for Oracle in version 15.7.1 SP204.

### 1.1.1 Unique Index Replication

SAP Replication Server provided support for table-oriented Data Definition Language (DDL) replication in a heterogeneous replication environment in previous releases. In this release, the following unique index DDL replication is also supported in a heterogeneous replication environment (from an Oracle primary database to the replicate database):

- Create unique index
- Drop index

#### Example

Create unique index:

```
Create unique index ord_customer_ix_demo  
ON orders (customer_id, sales_rep_id);
```

#### Example

Drop index:

```
Drop index ord_customer_ix_demo;
```

#### Note

You can replicate the unique index DDL in the heterogeneous replication environment only after the specified table objects are marked. Mark tables in one of the following ways:

- Use the `pdb_setreptable` command to mark tables for replication
- Turn on the `pdb_automark_tables` command and user tables are automatically marked during DDL replication

---

See *Chapter 1 Command Reference* in the *Replication Agent Reference Manual*. Also see *Unique Index Replication* in the *SAP Replication Server New Features Guide* for additional details.

## 1.1.2 Persistent Transaction Context

SAP Replication Agent truncates the transaction log based on the most recent truncation point received from the primary Replication Server. The truncation point is enabled to move in the long-running transactions in the primary database, as long as the transaction context is persistent.

### 1.1.2.1 New Parameters to Enable Persistent Transaction Context

To enable persistent transaction context, add the following Replication Agent configuration parameters:

- `lr_persist_tctx`
- `lr_persist_lrt_threshold`
- `lr_persist_records_threshold`
- `lr_persist_tctx_threshold`

#### `lr_persist_tctx`

Determines whether the transaction context is persistent for long-running transactions.

##### Default

true

##### Values

- true – enables the transaction context to be persistent for long-running transactions
- false – disables the transaction context persistence for long-running transactions

#### `lr_persist_lrt_threshold`

Determines the time frame a transaction must be open as a long-running transaction when the transaction context is persistent.

##### Default

3600 (seconds)

##### Values

1 to 18446744073709551615

## lr\_persist\_records\_threshold

Indicates the maximum number of records that are contained in a persistent active transaction context.

### Default

10000

### Values

1 to 18446744073709551615

## lr\_persist\_tctx\_threshold

Determines the number of transactions that trigger an open transaction persistence event when the transaction context is persistent.

### Default

100000

### Values

1 to 18446744073709551615

## 1.1.2.2 New Statistics of the ra\_statistic Command

The Log Reader component of the `ra_statistic` command returns new statistics.

## ra\_statistic

Returns performance-related statistics for Replication Agent components and the JAVA Virtual Machine (JAVA VM), or resets the statistics counters.

Table 1: Log Reader statistics for Oracle

Component	Statistic	Description
LR	Total transaction context persistence count	How many times the persistence occurs
LR	Total transaction context persistence time	How long it takes for all persistence (millisecond)
LR	Last transaction context persistence time	How long it takes for the last persistence (millisecond)
LR	Last start time of the persistent transaction	Last start time

### 1.1.2.3 New Command: ra\_truncate\_tctx

ra\_truncate\_tctx

Truncates the persistent transaction context in the Replication Agent System Database (RASD).

#### Syntax

```
ra_truncate_tctx <locator>
```

#### Parameter

**locator**

Identifies the cutoff point when truncating transaction context in the RASD.

##### Note

All the persistent transaction context that is older than the locator is truncated.

##### Example

Truncate the persistent transaction context in RASD:

```
1> ra_truncate_tctx
0000000003f3696300000000100001379000000000000000003f20c3900000000
2> go
Msg 0, Level 20, State 0:
Server 'raolgspl20', Procedure 'ra_truncate_tctx
0000000003f3696300000000100001379000000000000000003f20c3900000000',
Line 1:
successful
(0 rows affected)
```

##### Note

0000000003f3696300000000100001379000000000000000003f20c3900000000 is the truncation point that is received from the primary Replication Server.

### 1.1.2.4 Changed Command: ra\_helplocator

ra\_helplocator

Returns information about fields in the Log Transfer Manager (LTM) locator value.

## Syntax

```
ra_helplocator <locator_value>
```

## Parameter

### locator\_value

The hexadecimal string value of an LTM locator.

## Usage

The `ra_helplocator` command returns the following information about the LTM locator value:

- Locator field names
- Locator field hexadecimal values
- Locator field decimal values

The output for the `ra_helplocator` command is updated. With the `TRUNC_PT_SCN` parameter, the truncation point can move even the open transaction still exists, so the `OATSCN` parameter that locates the oldest open transaction system change number is obsolete.

```
1> ra_helplocator
0000000003f369630000000010000137900000000000000003f20c3900000000
2> go
Field                Hex Value          Decimal Value
-----
GENID                0x0000              0
SCN                  0x000003f36963     66283875
SCNGENID             0x0000              0
THREAD               0x0001              1
LSN                   0x00001379          4985
BLKNUM                0x00000000          0
BLKOFFSET            0x0000              0
TRUNC_PT_SCN         0x000003f20c39     66194489
LOCID                 0x00000000          0
```

### TRUNC\_PT\_SCN

The system change number for the truncation point that is received from the primary Replication Server.

For details on the `ra_helplocator` command, see *Chapter 1 Command Reference* in the *Replication Agent Reference Manual*.



## 1.1.3 Support for BRSPACE Command

Replication Agent for Oracle supports the replication of tables reorganized by the SAP ERP `BRSPACE` command.

The `BRSPACE` command reorganizes tables in the SAP ERP system. The `BRSPACE` command:

1. Creates an interim table with the new structure and copies the data from the original table into it.
2. Synchronizes intermediate changes into the interim table.
3. Drops the original table.
4. Renames the interim table to the name of the original table.

To support the replication of reorganized tables, Replication Agent:

1. Captures the data defined language (DDL) when an interim table is created and saves its article into the Replication Agent System Database (RASD).
2. Checks the organization action, and when the interim table is renamed, Replication Agent exchanges the article names of the interim table and the original table in the table schema.

### Note

- Replication Agent cannot replicate tables with column structure changed.
- Initialize Replication Agent before running the `BRSPACE` command.

## 1.1.4 New Replication Agent Permissions

Replication Agent adds new permissions to the following users to support the creation of DDL triggers when creating objects in Oracle during Replication Agent initialization:

- **pds\_username** — the user login name that Replication Agent uses for primary data server access.
- **ra\_admin\_owner** — the owner of all Replication Agent system objects, including shared and instance-specific system objects.

In Replication Agent 15.7.1 SP204, DDL triggers can also be created in the primary database during Replication Agent initialization. To support the creation of DDL triggers in the primary database, new permissions are granted to the user specified by the **pds\_username** parameter:

- **GRANT SELECT ON V\$\_DATABASE** — required to select from the **V\$\_DATABASE** views to get primary database information during initialization.
- **GRANT ADMINISTER\_DATABASE\_TRIGGER** — required to manage database-level triggers during initialization and enable automarking function.
- **GRANT CREATE\_TRIGGER** — required to create triggers in the primary database during initialization.

For the user specified by the **ra\_admin\_owner** parameter, if it is different from the user specified by the **pds\_username** parameter, besides granting all the preceding permissions, the following additional permissions are also granted:

- **GRANT EXECUTE ON DBMS\_FLASHBACK** — required to execute **DBMS\_FLASHBACK.get\_system\_change\_number**.
- **GRANT SELECT ON SYS.OBJ\$** — required for processing procedure DDL commands in the repository.

- **GRANT SELECT ON SYS.USER\$** — required for Oracle user identification.
- **GRANT SELECT ON SYS.TAB\$** — required to support table replication.
- **GRANT SELECT ON SYS.CDEF\$** — required to support table replication (constraint information).
- **GRANT SELECT ON SYS.LOB\$** — required for LOB replication support.
- **GRANT SELECT ON SYS.IND\$** — required to identify indexes.

All these permissions are generated by running the **ra\_admin prepare** script.

Refer to the *SAP Replication Server Reference Manual* and *Replication Agent Permissions* in the *Replication Agent Primary Database Guide* for more details.

## 1.2 New Features in Replication Agent for Microsoft SQL Server in SP204

Replication Agent includes several new enhancements for Microsoft SQL Server in version 15.7.1 SP204.

### 1.2.1 New Mode to Mark Database Object with MSSQL CDC API

Replication Agent for Microsoft SQL Server (RAM) introduces a new mode to mark and unmark primary database objects with Microsoft SQL Server (MSSQL) Change Data Capture (CDC) API.

#### New Configuration Parameter

RAM introduces a new parameter to mark or unmark database objects.

`pdb_dcmode`

##### Values

- **native**  
(Default) Uses stored procedures, deployed in the resource database, to mark or unmark database objects.
- **mscdc**  
Uses the MSSQL CDC API to mark or unmark database objects. RAM does not need Microsoft SQL Server to run in single user mode to deploy stored procedures to the resource database.

##### Usage

- Configure the parameter before initiating xlog using the `ra_admin init` command.
- If the data capture mode is `mscdc`, the stored procedure replication and the truncate table are not supported.

## Impacts to Other Commands

The new mode parameter affects the existing commands as follows:

- `server_xlog` – creates or removes transaction-log-base objects in the Microsoft SQL Server system resource database.

### Note

Errors occur when running the `server_xlog` command with or without any parameters when the data capture mode is `mscdc`.

- `ra_admin init` – initiates xlog for RAM.

### Note

If the data capture mode is `mscdc`, RAM does not verify if stored procedures are deployed in the resource database. xlog is initiated directly.

- `sp_setrepproc` – enables or disables replication for a stored procedure, or displays the current replication status of a stored procedure.

### Note

Errors occur when running the `sp_setrepproc` command with or without any parameters when the data capture mode is `mscdc`.

## Upgrade of Data Capture Mode Switch

Upgrading from the native mode to the `mscdc` mode is supported.

### Note

- Downgrading to previous versions is not supported.
- Finalization is conducted automatically.
- Upgrading from the `mscdc` mode to the native mode is not supported.

Run the following command to switch the mode:

```
ra_admin -u -dc mscdc
```

### Parameter

#### `-dc`

Only valid with the `ra_admin -u` command to change the data capture mode.

### Note


- The `-dc` parameter only supports the value of `mscdc`.

- Parameter is ignored if the data capture mode is already msdc.

## 1.3 Administering Replication Agent as a Windows Service Using the ServiceAdmin Utility

Use the `ServiceAdmin` utility in the `<SAP>\RAX-15_5\winservice\bin` directory to administer Replication Agent as a Windows Service. The `ServiceAdmin` utility creates a Windows service that runs in a 64-bit Java Virtual Machine (JVM), and is the successor to the `agt_service` utility that creates services that run in a 32-bit JVM.

### Prerequisites

- The Visual C++ Redistributable Packages for Visual Studio 2013 must be installed to use the `ServiceAdmin` utility. They can be downloaded from <http://www.microsoft.com/en-us/download/details.aspx?id=40784>   
If the packages are not installed, the `ServiceAdmin` utility fails with the error message: Missing Library Dependencies for ServiceAPI.dll, Check That the Library Exists and the Microsoft Visual C Runtime Redistributables is Installed.
- If you previously created Windows services using the `agt_service` utility, uninstall them prior to installing services with the new `ServiceAdmin` utility.

### Procedure

1. In the command prompt, navigate to the `<SAP>\RAX-15_5\winservice\bin` directory and enter:

```
ServiceAdmin
```

2. In the Replication Agent Windows Service Agent console, enter the appropriate command for administering options as a Windows service.

For the list of administrative commands, see [Administrative Commands \[page 12\]](#).

### 1.3.1 Administrative Commands

The Replication Agent provide a series of commands for administering options as a Windows service.

---

### 1.3.1.1 AddService

Creates a Windows service for the specified Replication Agent instance. A new service configuration file, RepAgent\_<instance>\_WinSvc.ini, is added to <SAP>\RAX-15\_5\config\.

Edit the \*.ini file before starting or restarting the Windows service if you want to change the default settings.

#### Syntax

```
AddService <ra.instance.dir>
```

#### Parameters

**ra.instance.dir**

the directory of an existing Replication Agent instance.

### 1.3.1.2 RemoveService

Removes the Windows service for the Replication Agent instance located in the specified Replication Agent instance directory.

#### Syntax

```
RemoveService <ra.instance.dir>
```

#### Parameters

**ra.instance.dir**

the directory of an existing Replication Agent instance.

---

### 1.3.1.3 StartService

Starts the service for the specified Replication Agent instance, which uses the service configuration located in the file <SAP>\RAX-15\_5\config\RepAgent\_<instance>\_WinSvc.ini.

Edit the \*.ini file before starting or restarting the Windows service if you want to change the default settings.

#### Syntax

```
StartService <ra.instance.dir>
```

#### Parameters

**ra.instance.dir**

the directory of an existing Replication Agent instance.

### 1.3.1.4 StopService

Stops the Windows service for the Replication Agent instance located in the specified Replication Agent instance directory.

#### Syntax

```
StopService <ra.instance.dir>
```

#### Parameters

**ra.instance.dir**

the directory of an existing Replication Agent instance.



---

### 1.3.1.5 ShowServiceConfig

Displays the Windows service configuration file <SAP>\RAX-15\_5\config\RepAgent\_<instance>\_WinSvc.ini in the console window.

#### Syntax

```
ShowServiceConfig <ra.instance.dir>
```

#### Parameters

**ra.instance.dir**

the directory of an existing Replication Agent instance.

### 1.3.1.6 SetDebug

Displays, enables, or disables debug mode.

#### Syntax

```
SetDebug <on|off>
```

#### Parameters

**on|off**

the debug mode of an existing Replication Agent instance.

---

## 1.3.1.7 Quit

Quits the ServiceAdmin utility.

### Syntax

```
Quit
```

### Parameters

None

## 1.3.1.8 Help

Provides help information for a command. When you execute the `help` command without any parameters, it displays help information for all commands.

### Syntax

```
Help <command>
```

### Parameters

**command**

the name of the command for which to display help information.

## 1.4 Replication Agent Upgraded to jConnect 16.0 PL04

SAP Replication Agent uses SAP jConnect for JDBC to manage connections to Open Client/Open Server applications, including SAP Replication Server and its RSSD. Replication Agent formerly included jConnect 16.0 PL03; now it includes jConnect 16.0 PL04.

## 1.5 Replication Agent Objects in the Primary Oracle Database

SAP Replication Agent for Oracle creates tables, database triggers, and other objects in the Oracle primary database.

A new database-level DDL trigger object, `<prefix>CREATETABLE_TRIG`, prepares newly created tables for replication when table-level supplemental logging and automark are enabled. When the trigger fires it alters the table to add supplemental logging for primary and unique keys and adds the table name to the MOTIDS filter table for inclusion in log scans.

The topic that follows is a revision of *Replication Agent Primary Database Guide > Replication Agent for Oracle > Replication Agent Objects in the Oracle Primary Database > Table Objects*. It replaces *Table Objects* and its four subtopics. The revised topic simplifies the presentation of the table objects and introduces the MOTIDS table, which was introduced in SAP Replication Server Options 15.7.1 SP202 but not documented at that time.

### 1.5.1 Table Objects

Replication Agent creates table objects in the Oracle primary database.

These tables are considered Replication Agent objects.

Table 2: Replication Agent Tables

Table Name	Table Description
<code>&lt;prefix&gt;TABLE</code>	Records information about the tables marked for replication.
<code>&lt;prefix&gt;RA_XLOG_SYSTEM_</code>	Records information about objects Replication Agent creates in the primary database.
<code>&lt;prefix&gt;RA_PROCACTIVE</code>	Records state information about stored procedures being replicated.
<code>&lt;prefix&gt;MARKERSH</code>	Shadow table for tracking marker procedures.
<code>&lt;prefix&gt;PROCEDURE</code>	Records which procedures are marked for replication.
<code>&lt;prefix&gt;MOTIDS</code>	Records the objects being used to build the filter query in LogMiner.

---

## 2 New Features in Replication Server Options 15.7.1 SP203

Learn about the new features in SAP® Replication Server® Options 15.7.1 SP203 and its component, Replication Agent™.

### 2.1 New Features in Replication Agent for Oracle

Replication Agent includes several new enhancements for Oracle in version 15.7.1 SP203.

#### 2.1.1 New API Command

Replication Agent introduces a new API command `pdb_systablefilter` that filters out tables from initialization, marking, and replication by table name prefixes when the primary database is Oracle.

##### Syntax

```
pdb_systablefilter [ {add | remove}, <prefix> ]
```

##### Parameters

###### add

The add keyword filters out any table that table name begins with the prefix you specify. Any objects that begin with this prefix cannot be marked for initialization.

###### remove

The remove keyword removes the filter for the prefix you specify. Any objects that begin with this prefix can be marked for initialization.

###### prefix

The table name prefix that is used for filtering. The prefix character is case sensitive.

---

## Examples

### **pdb\_systablefilter**

This command returns a list of all prefixes which tables begin with will be filtered for initialization and replication.

### **pdb\_systablefilter add, PRE1**

This command adds the PRE1 prefix to the list of prefixes which tables begin with will be filtered for initialization and replication.

### **pdb\_systablefilter remove, PRE1**

This command removes the PRE1 prefix from the list of prefixes which tables begin with will be filtered for initialization and replication.

## Usage

- `pdb_systablefilter` can be used to limit the number of objects that are loaded into the Replication Agent System Database during initialization (`ra_admin init`). When `ra_admin init` is processed, the tables which begin with the ones in the `pdb_systablefilter` list will not be loaded.
- `pdb_systablefilter` can be used to filter out the objects which user consider as system tables. This filter takes effect during marking all (`pdb_setreptable all,mark`), and DB materialization (`pdb_find_table`). But you can mark the table individually (`pdb_setreptable table_name,mark`).
- When `pdb_systablefilter` is invoked, its function is determined by the keywords and options you specify.
- When multiple keywords and options are specified, each must be separated by a comma. Blank space before or after a comma is optional. For example: `pdb_systablefilter add, PRE1`
- When `pdb_systablefilter` is invoked with no keyword, it returns a list of prefixes which tables begin with will be filtered for initialization and replication.
- The `pdb_systablefilter` command is valid only when the Replication Agent instance is in the Admin or Replication Down state.
- You cannot remove the ones in the default list. The default prefixes are: SYS\_, ORA\_, AQ\$\_, QT\$\_.

## 2.1.2 Support for Oracle Exadata Server 11.2

Replication Agent is certified against Oracle Exadata server 11.2 with Replication Agent running on a remote host and not requiring any shared access to the Oracle archive log files.

---

## 2.1.3 Support Replication of Tables Created in Bigfile Tablespace

Replication Agent supports replication of tables that are created in Oracle bigfile tablespace.

If you have marked a primary table created in Oracle bigfile tablespace for replication in a release prior to Replication Agent 15.7.1 SP203 release, you need to upgrade to SP203 or later releases and unmark and remark the table for replication before using this feature.



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## 3 New Features in Replication Server Options 15.7.1 SP202

Learn about the new features in SAP® Replication Server® Options 15.7.1 SP202 and its component, Replication Agent™.

### 3.1 New Features in Replication Agent for Microsoft SQL Server

Replication Agent includes several new enhancements for Microsoft SQL Server in version 15.7.1 SP202.

#### 3.1.1 Support `display_only` Option for `rs_create_repdef` Command

Replication Agent supports the `display_only` option for the `rs_create_repdef` command when the primary database is Microsoft SQL Server. This option was previously available only when the primary database is Oracle or IBM DB2 UDB.

Refer to `rs_create_repdef` in the *SAP Replication Agent Reference Manual* for more details.

---

## 4 New Features in Replication Server Options 15.7.1 SP201

Learn about the new features in SAP® Replication Server® Options 15.7.1 SP201 and its component, Replication Agent™.

### 4.1 New Features in Replication Agent for Oracle

To improve scanning performance, Replication Agent for Oracle 15.7.1 SP201 introduces support for running multiple scanners in parallel with the LogMiner Log Reader component.

Replication Agent for Oracle 15.7.1 SP201 also supports data definition language (DDL) replication in heterogeneous environments using XStream APIs.

#### 4.1.1 Parallel Scan Support

Replication Agent for Oracle allows you to run multiple scanner threads in parallel to read from transaction logs. Parallel scan is supported only with the Oracle LogMiner Log Reader component. Parallel scanners cannot be used to replicate tables containing large object (LOB) datatypes.

For a parallel scan, include a single Replication Agent process with multiple scanner threads to read from the Oracle transaction logs. Each thread that reads data records from the next batch of Oracle transaction logs is sorted in a round-robin fashion. For example, a single scanner reads a batch of log records and sends them to the operation processor thread, which then reads the next batch while the next scanner sends its batch to the operation processor thread.

To use parallel scan, set these configuration parameters:

- `lr_parallel_scan`
- `lr_parallel_scan_range`
- `lr_parallel_scanner_count`
- `lr_parallel_scan_queue_size`

##### 4.1.1.1 `lr_parallel_scan`

(Oracle only) Determines whether Replication Agent can run multiple Oracle LogMiner scanners in parallel or whether a single scanner thread is used, relying on the Oracle LogMiner Continuous Mine option.

---

## Default

true

## Values

- `true` – Replication Agent runs multiple Oracle LogMiner scanners in parallel.
- `false` – Replication Agent runs a single scanner using the Oracle LogMiner Continuous Mine option.

## Comments

Use `lr_parallel_scan` to improve performance and reduce read and process latency by querying the Oracle transaction log using multiple parallel scanner threads.

### 4.1.1.2 `lr_parallel_scan_range`

(Oracle only) The maximum number of system change numbers (SCN) processed by each Oracle LogMiner scanner, when parallel scan is enabled, that is, when `lr_parallel_scan` is true.

## Default

1000

## Values

An integer from 1 to 2147483647.

### 4.1.1.3 `lr_parallel_scanner_count`

(Oracle only) The maximum number of Oracle LogMiner scanners running in parallel, when parallel scan is enabled, that is, when `lr_parallel_scan` is true.

---

## Default

4

## Values

An integer from 1 to 250.

### 4.1.1.4 `lr_parallel_scan_queue_size`

(Oracle only) The maximum scan queue size of each single LogMiner scanner, when parallel scan is enabled, that is, when `lr_parallel_scan` is true.

## Default

0 (scan queue size is unlimited)

## Values

0 to 2147483647

## 4.1.2 DDL Replication Using XStream APIs in Heterogeneous Environments

The Replication Agent for Oracle Log Reader with XStream APIs now supports data definition language (DDL) replication in heterogeneous replication environments.

Use `pdb_setrepddl` to view the DDL replication status, and to enable or disable replication of DDL statements.

Replication Agent for Oracle supports these DDL configuration parameters:

- `pdb_automark_tables`
- `ddl_password`
- `ddl_username`

For details, see the *Replication Agent Reference Manual*.

---

## 4.2 New Feature in Replication Agent for Microsoft SQL Server

The Replication Agent for Microsoft SQL now supports the `display_only` option with `rs_create_repdef`. The `display_only` option is now available for Replication Agent for Microsoft SQL Server.

Use the `display_only` option with `rs_create_repdef` to view the proposed Replication Command Language (RCL) or syntax that Replication Agent sends to SAP® Replication Server® for creating the replication definition.

### Note

The `display_only` option already exists in Replication Agents for UDB and Oracle.

### Example

#### Example

```
rs_create_repdef table22, display_only
```

## 4.3 New Command

Use the `pdb_get_table_md` command result to get the column metadata, including the Replication Server type mapping, for the specified table.

### 4.3.1 `pdb_get_table_md`

Returns a list of columns in a table from the primary database.

#### Syntax

```
pdb_get_table_md <ownername>, <tablename>
```

## Parameters

### ownername

The user name of the owner of the table specified in `<tablename>`. To specify character case, delimit the value with quotes.

### tablename

The name of the table in the database for which information is returned. To specify character case, delimit the value with quotes.

## Examples

### Example 1

Returns a list of all the columns in the `<authors>` table owned by the user `<bob>`.

```
pdb_get_table_md <bob>, <authors>
```

## Usage

- Use `pdb_get_table_md` result to get the column metadata, including the Replication Server type mapping, for the specified table.  
The metadata contains a row for each column that includes the column name, ID, length, scale, primary database type, Replication Server type, whether the column is nullable, and whether the column is a primary key or part of a unique index.  
For numeric types, the precision is described in the length column.  
The Replication Server type includes the length for applicable binary and character types. Replication Agent pads the length for the applicable character types to account for any additional SAP Replication Server storage requirement for characters if the primary database character set is:
  - Different from the SAP Replication Server character set.
  - Single byte, while the SAP Replication Server character set is multibyte.
- You can execute `pdb_get_table_md` in any Replication Agent state.
- `pdb_get_table_md` returns an error if Replication Agent cannot connect to the primary database or SAP Replication Server, or if the SAP Replication Server primary database connection is not available.

See `pdb_get_tables`, `pdb_get_columns`, and `pdb_get_primary_keys` in the *Replication Agent Reference Manual*.



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## 5 New Features in Replication Server Options 15.7.1 SP200

Learn about the new features in SAP® Replication Server® Options 15.7.1 SP200 and its component, Replication Agent™.

### 5.1 New Features for Replication into SAP HANA Database

Replication Agent 15.7.1 SP200 includes several enhancements that support SAP HANA® database replication.

#### 5.1.1 Replication Support for SAP Business Suite Applications

Replication Agent supports replication into the SAP HANA database from SAP Business Suite applications running on Oracle, IBM DB2 UDB, or Microsoft SQL Server.

See *Replication Server Quick Start Guide for SAP HANA Database* and *Replication Server Heterogeneous Replication Guide*.

#### 5.1.2 DDL Replication Enhancements

Replication Agent and SAP® Replication Server® support replication of several data definition language (DDL) commands in a heterogeneous replication environment when the replicate is an SAP HANA database.

Replication Agent and Replication Server supports replication of these DDL commands into SAP HANA database when the primary database is Oracle, Microsoft SQL Server, or DB2 UDB:

- `create table`
- `alter table (add column or drop column)`
- `rename table`
- `drop table`

With this enhancement, Replication Server automatically alters the database replication definition to reflect any DDL changes in a database that is marked for replication at the database level, if database replication definition is defined with the `auto_update_table_list` or `auto_extend_table_list` parameter. For example, if a database is marked for replication and a table is subsequently added to the database, replication is automatically established for the newly added table.

---

Note that a table that is created, altered, renamed, or dropped is not normalized by the table replication definition except for the replicate table owner, if:

- The replicate table owner defined is in the table replication definition, and
- The replicate site is subscribed to the table replication definition.

See:

- *SAP Replication Server Reference Manual > Replication Server Commands > create database replication definition.*
- *SAP Replication Server Heterogeneous Replication Guide > SAP HANA Database as Replicate Data Server > DDL Replication in Heterogeneous Replication Environment.*

### 5.1.3 Setup and Configuration of Replication to SAP HANA Database Using RMA

Replication Management Agent (RMA) is a distributed management agent that you can use to set up and manage replication from any supported databases to an SAP HANA database.

RMA supports automated setup, configuration and materialization, monitoring, and administration of an SAP Business Suite or non-Business Suite system.

Using RMA, you can set up replication for these primary databases to a replicate SAP HANA database:

- IBM UDB DB2
- Microsoft SQL Server
- Oracle

RMA also supports replicating an ERP database from any of the supported databases. For instructions about setting up replication using RMA, see the *Replication Management Agent Configuration and Users Guide*.

### 5.1.4 Support for SAP HANA Database as a Primary Dataserver

You can use the Replication Agent for SAP HANA database to configure, manage, and deploy a replication model that replicates data from a primary to a replicate SAP HANA database.

Replication Agent for SAP HANA, which runs inside a Replication Management Agent (RMA) container, performs initial data extraction and load, and also replicates data changes on the primary SAP HANA server to the replicate SAP HANA server.

For instructions about installing and deploying a replication model, see the *Replication Agent for SAP HANA Database Configuration and Users Guide*.

## 5.2 New Features in Replication Agent

Replication Agent includes several enhancements in version 15.7.1 SP200.

### 5.2.1 Support for Approximate Datatypes as Primary Keys

The Replication Agent 15.7.1 SP200 now uses approximate datatypes as primary keys in a replication definition.

In SAP replication technology, `double`, `float`, and `real` datatypes are considered as approximate values, which require some level of precision rounding.

For example, an approximate value of 1.234567890 on machine A is rounded to 1.234567900 on machine B. If you replicate an `update` statement at machine A by issuing:

```
update mytable where col1 = '1.234567890'
```

The `update` statement executes successfully at machine A; but the Replication Agent does not update any rows at machine B because 1.234567890 does not equal 1.234567900.

By default in earlier versions, SAP Replication Server excluded approximate datatype (`float`, `real`, and `double`) columns from the replication definition.

In earlier versions of Replication Agent, if you issue `rs_create_repdef` with these primary table values:

```
create table(pkey1 int primary_key, pkey2 float primary_key, col3 varchar(300))
```

The resulting replication definition included only `pkey1` in the primary key definition; `pkey2` was excluded.

With Replication Agent 15.7.1 SP200, you can use the `repdef_allow_approx_pkey` configuration parameter to override the default `rs_create_repdef` behavior. When `repdef_allow_approx_pkey` is true, both `pkey1` and `pkey2` columns are included in the replication definition.

The `repdef_allow_approx_pkey` configuration parameter is supported by primary IBM DB2 UDB, Microsoft SQL Server, and Oracle databases.

See `rs_create_repdef` in the *Replication Agent Reference Manual*.

### 5.2.2 Generate Replication Definitions When Primary and Replicate Table Schemas are Different

Use `rs_repdef_schema_map` before generating replication definitions if the primary and replicate table schemas are different.

In earlier versions, if the primary and replicate table schemas were different, you had to manually create replication definitions. Now, you can use `rs_repdef_schema_map` with the `add` option before using these commands to generate replication definitions:

- `rs_create_repdef`
- `pdb_setreptable` when the configuration parameter `pdb_auto_create_repdefs` is `true`.

See *Replication Agent Reference Manual*.

### Example

#### Example:

If `<user1>` is the primary table schema and `<user2>` is the replicate table schema, execute `rs_repdef_schema_map` with the `add` option:

```
rs_repdef_schema_map add, user1, user2
```

For any automatically generated replication definition, Replication Agent generates the syntax:

```
create replication definition [replication_definition_name]
with primary at [primary_database_name]
with primary table named user1.primary_table_name
with replicate table named user2.primary_table_name
```

## 5.2.3 Data Tracing Improvements

You can now set trace filters to log only the information that matches the user-defined filters in the Replication Agent system trace logs.

Trace filters make debugging easier by reducing the amount of data that is logged in the Replication Agent log files.

In Replication Agent 15.7.1 SP200 you can set trace filters for Log Transfer Language (LTL) only.

See `trace_filter` in the *Replication Agent Reference Manual*.

## 5.2.4 New Log Reader Statistics

The `ra_statistics` command returns additional log reader statistics for Microsoft SQL Server and Oracle databases.

Table 3: Log Reader Statistics

Statistic	Description
(Microsoft SQL Server only) Estimated time to the end of the log (sec)	The approximate scan time in seconds to reach the end of the transaction log
(Microsoft SQL Server only) Approximate number of log operations to scan	The approximate number of log operations that are to be scanned

Statistic	Description
(Oracle XStream only) Last scanned record locator	The last scanned record retrieved from an Oracle XStream outbound server

See `ra_statistics` in the *Replication Agent Reference Manual*.

## 5.2.5 New Commands

New Replication Agent commands.

Table 4:

Command	Description
<code>pdb_setrepddl</code>	Returns the DDL replication status, and enables or disables replication for DDL statements.  Replication Agent for UDB now supports the <code>pdb_setrepddl</code> command. This command was already available for Replication Agents for Microsoft SQL Server and Oracle.
<code>ra_helpconnection</code>	Displays all primary data server SQL connections and client sessions.
<code>ra_helpsrvsession</code>	Returns Replication Agent client session information.
<code>ra_killconnection</code>	Terminates the primary data server SQL connections.  You can terminate all free SQL connections, all SQL connections, or a particular SQL connection by specifying the connection ID.
<code>rs_repdef_schema_map</code>	Returns the current replication definition schema map, and adds or removes a replication schema map.

See the *Replication Agent Reference Manual*.

## 5.2.6 New Parameters

New Replication Agent parameters.

Table 5:

Parameter	Description
ddl_username	<p>The database user name included in LTL for replicating DDL commands to the standby database. This user must have permission to execute all replicated DDL commands at the standby database.</p> <div><p><b>i Note</b></p><p>You do not need to set the <code>ddl_username</code> and <code>ddl_password</code> parameters if the Replication Server parameter <code>dsi_replication_ddl</code> is on.</p></div> <p>Replication Agent for UDB now supports the <code>ddl_username</code> parameter. This command was already available for Replication Agents for Microsoft SQL Server and Oracle.</p>
ddl_password	<p>Updates the log device repository in the Replication Agent System Database (RASD). Identifies the password for <code>ddl_username</code>.</p> <p>Replication Agent for UDB now supports the <code>ddl_password</code> parameter. This command was already available for Replication Agents for Microsoft SQL Server and Oracle.</p>
pdb_automark_tables	<p>Specifies whether Replication Agent automatically marks tables for replication during DDL replication.</p> <p>Replication Agent for UDB now supports the <code>pdb_automark_tables</code> parameter. This command was already available for Replication Agents for Microsoft SQL Server and Oracle.</p>
pdb_automark_nocdc_error	<p>(IBM DB2 UDB only) Specifies whether to stop replication if DDL replication and automark is enabled but the table data capture is not enabled in the same create table transaction.</p>
pds_admin_connection_pool_size	<p>(IBM DB2 UDB only) Specifies the primary data server admin connection pool size.</p>
pds_sql_connection_pool_size	<p>Specifies the primary data server SQL connection pool size.</p>



Parameter	Description
<code>ra_autocorrect_on_mark</code>	<p>Determines whether to autocorrect tables marked for replication immediately.</p> <p>In version 15.7.1 SP200, by default, Replication Agent autocorrects tables marked for replication when the <code>ra_autocorrect_on_mark</code> configuration parameter value is set to true.</p>

See the *Replication Agent Reference Manual*.

## 5.3 New Features in Replication Agent for Oracle

Replication Agent for Oracle includes several enhancements in version 15.7.1 SP200.

### 5.3.1 Support for Oracle 12c

Replication for Oracle 15.7.1 SP200 now supports Oracle 12c database at the same functional level of Oracle 11g.

The Replication Agent for Oracle Log Reader component with LogMiner requires the `GRANT LOGMINING TO <pds_username>` administrative permission to read from Oracle 12c transaction logs. If the `GRANT LOGMINING TO <pds_username>` permission is granted, do not grant `SELECT ON V_$LOGMNR_LOGS` and `SELECT ON V_$LOGMNR_CONTENTS` permissions separately.

See the *Replication Agent 15.7.1 SP200 Primary Database Guide*.

### 5.3.2 DDL Replication Using XStream APIs

The Replication Agent for Oracle Log Reader now supports data definition language (DDL) statements only in an Oracle-to-Oracle replication environment using XStream APIs.

Use the `pdb_setrepddl` to view the DDL replication status, and to enable or disable replication of DDL statements.

Replication Agent for Oracle supports these DDL configuration parameters:

- `pdb_auto_alter_repdefs`
- `pdb_automark_tables`
- `lr_send_trunc_partition_ddl`
- `ddl_password`

- `ddl_username`

See *Replication Agent Reference Manual*.

## 5.4 New Features in Replication Agent for Microsoft SQL Server

Replication Agent for Microsoft SQL Server includes several enhancements in version 15.7.1 SP200.

### 5.4.1 Support for Replication Agent for Microsoft SQL Server on Windows Failover Clustering

You can now set up Replication Agent for Microsoft SQL Server 15.7.1 SP200 on a shared disk, and add it as a generic application on the Windows Server Failover Clustering (WFSC) cluster.

In the WFSC cluster setup, Replication Agent for Microsoft SQL Server supports only the instance-level high availability cluster configuration for Microsoft SQL Server database. Replication Agent does not support the database-level high availability (an availability group) cluster configuration.

See *Setting Up Replication Agent for Microsoft SQL Server on Windows Server Failover Clustering* in the *Replication Agent Primary Database Guide*.

### 5.4.2 New Stored Procedure

Replication Agent for Microsoft SQL Server introduces the `sp_SybTruncateTable` stored procedure to support truncation of tables marked for replication from SAP enterprise resource planning (ERP) or any applications.

Earlier versions of Replication Agent for Microsoft SQL Server does not support truncation of tables marked for replication from any applications due to the Microsoft SQL Server database limitation.

In 15.7.1 SP200, you can execute the `sp_SybTruncateTable` stored procedure to truncate tables marked for replication from SAP enterprise resource planning (ERP) applications. When you issue `sp_SybTruncateTable`, the stored procedure turns off the replication flag for the marked tables temporarily, issues the `truncate table` command, and then turns on the replication flag.

The SAP ERP system that uses Replication Agent for Microsoft SQL Server for replication requires the latest patch of the SAP Kernel that has the `sp_SybTruncateTable` stored procedure.

See SAP Note 1972365 – *Retry on error 4711*: <https://css.wdf.sap.corp/sap/support/notes/1972365> 📄 for the SAP Kernel download and installation instructions.

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The `sp_SybTruncateTable` stored procedure is installed during first-time initialization with `server_admin_init`. The truncate table DDL statements are always sent to SAP Replication Server as data manipulation language (DML) transactions.

See *The `sp_SybTruncateTable` Stored Procedure* in the *Replication Agent Primary Database Guide*.

## 5.5 New Features in Replication Agent for UDB

Replication Agent for UDB includes several enhancements in version 15.7.1 SP200.

### 5.5.1 Support for IBM DB2 UDB 10.5

Replication Agent supports replication from IBM DB2 UDB 10.5 at the IBM DB2 UDB 9.7 functional level.

### 5.5.2 Support for DDL Replication in Replication Agent for UDB

Replication Agent for UDB now supports replication of several DDL commands.

- `create table`
- `alter table(add column)`
- `rename table`
- `drop table`

When you create a new table, and if `pdb_automark_tables` is true, Replication Agent for UDB automatically marks the table for replication.

For automatic marking of tables to succeed, you must manually set the value of the table `DATA CAPTURE` option to `DATA CAPTURE CHANGES` in the same transaction as the `create table` DDL command. Otherwise, Replication Agent for UDB logs an error message in the system log and in the `NOCDERRORTRC` trace log for this event, along with the name of the newly created table. Replication Agent for UDB continues replicating all tables that are marked for replication.

To troubleshoot errors when Replication Agent for UDB fails to replicate DDL commands for a newly created table, see *Troubleshooting DDL Replication Failure in Replication Agent for UDB* in the *Replication Agent Administration Guide*.

## 5.6 System Management Tool

You can use the SAP® Control Center to manage your replication system and environment.

### 5.6.1 Removal of Sybase Central

Sybase Central is no longer available from any SAP or Sybase Web site. Use SAP Control Center to manage your replication environment.

See *SAP Control Center for Replication*.

## 5.7 Supported and Unsupported Datatypes

Supported and unsupported datatypes in Replication Server Options 15.7.1 SP200.

### 5.7.1 Datatypes for Oracle Replication

Supported and unsupported datatypes for replicating into and out of Oracle.

#### Replicating Datatypes into Oracle

These SAP (formerly Sybase) datatypes are supported or unsupported by ExpressConnect for Oracle for replicating into Oracle.

Table 6: ExpressConnect Supported and Unsupported SAP Datatypes

Datatype	Supported	Unsupported
SAP (formerly Sybase)	bigint	bigdatetime
	integer	bigtime
	smallint	
	tinyint	
	decimal	

Datatype	Supported	Unsupported
	numeric	
	unsigned bigint	
	unsigned integer	
	unsigned smallint	
	unsigned tinyint	
	unichar	
	univarchar	
	unitext	
	float	
	double	
	real	
	money	
	smallmoney	
	date	
	time	
	datetime	
	smalldatetime	
	timestamp	
	char	
	nchar	
	varchar	
	nvarchar	
	text	
	binary	
	varbinary	

Datatype	Supported	Unsupported
	image	
	bit	
	sysname (same as varchar(30))	
	longsysname (same as varchar(255))	
	user-defined datatypes (as underlying type)	

These Oracle datatypes are supported or unsupported by ExpressConnect for Oracle for replicating into Oracle.

Table 7: ExpressConnect Supported and Unsupported Oracle Datatypes

Datatype	Supported	Unsupported
Oracle	anydata (limited support)	Associative array
	bfile (only for replication, not gateway)	mlslabel
	binary_double	Nested tables
	binary_float	Oracle-supplied datatypes
	blob	Partial large object (LOB) updates
	char	ref
	clob	User-defined datatypes (UDDs) containing LOBs
	date	UDDs that are not final
	interval day to second	urowid
	interval year to month	varray
	long	SecureFile LOBs
	long raw	Oracle 11g xmltype
	nchar	
	nclob	
	number	

Datatype	Supported	Unsupported
	nvarchar2	
	raw	
	rowid	
	simple_integer	
	timestamp	
	timestamp with [local] time zone	
	UDD object type (only for replication, not gateway)	
	varchar2	
	Oracle 10g xmltype (limited support, handled as clob)	

## Replicating Datatypes out of Oracle

These Oracle datatypes are supported or unsupported by Replication Agent for replicating out of Oracle.

Table 8: Replication Agent Supported and Unsupported Oracle Datatypes

Datatype	Supported	Unsupported
Oracle	anydata (limited support)	associative array
	binary_double	bfile
	binary_float	mlslabel
	blob	nested tables
	char	Oracle-supplied datatypes
	clob	partial LOB updates
	date	ref
	interval day to second	UDDs containing LOB
	interval year to month	UDDs that are not final
	long	urowid

Datatype	Supported	Unsupported
	long raw	varray
	nchar	
	nclob	
	number	
	nvarchar2	
	raw	
	rowid	
	simple_integer	
	(Only if the your primary database is Oracle 11g Release 2 or later) SecureFile LOBs	
	timestamp	
	timestamp with [local] time zone	
	UDD object type	
	varchar2	
	xml type (limited support, handled as clob)	

## Oracle-Supplied Datatype Limitations

Replication Agent cannot replicate these Oracle-supplied datatypes:

- “ANY” types (`SYS.ANYTYPE`, `SYS.ANYDATASET`), except for `SYS.ANYDATA`.
- Oracle 10g and 11g `XMLType` data replicated to Oracle 11g. Replication Agent does support replicating `XMLType` data to Oracle 10g.
- Spatial types (`MDSYS.SDO_GEOMETRY`, `SDO_TOPO_GEOMETRY`, `SDO_GEORASTER`).
- Media types (`ORDSYS.ORDAudio`, `ORDSYS.ORDImage`, `ORDSYS.ORDImageSignature`, `ORDSYS.ORDVideo`, `ORDSYS.ORDDoc`, `SI_StillImage`, `SI_Color`, `SI_AverageColor`, `SI_ColorHistogram`, `SI_PositionalColor`, `SI_Texture`, `SI_FeatureList`).
- Expression filter type.
- Replication from an `ANYDATA` column to a non-`ANYDATA` column.
- `ANYDATA` size exceeding 16KB, which is the size constraint of the Replication Server `OPAQUE` datatype.
- `BFile`, `UROWID`, `REF`, `NESTED TABLE`, and `VARRAY` datatypes stored in the `ANYDATA` column.



- `XMLType` not stored as `CLOB`.

#### **i** Note

`XMLType` stored as `CLOB` can be replicated to Oracle 10g and to SAP® Adaptive Server® Enterprise (SAP® ASE). Replication Agent does support replicating `XMLType` data to Oracle 11g.

- Replication of data stored in Oracle XML DB repository using standard protocols such as FTP and HTTP(S) or WebDAV, and other Oracle XML DB API
- Marking procedures that use `PLS_INTEGER` PL/SQL type or any of its other subtypes; however, Replication Agent does support marking procedures that use `SIMPLE_INTEGER` PL/SQL type.

Replication Agent cannot replicate some Oracle datatypes, because XStream APIs do not support them in row Logical Change Records (LCRs).

- `BFile`
- `ROWID`
- User-defined datatypes, such as `REF`, including these object types:
  - `NESTED TABLE`
  - `VARRAY`
- `XMLType` object stored relationally or as a binary `XML`

These Oracle datatypes are also not supported by XStream APIs:

- “ANY” types (`SYS.ANYTYPE`, `SYS.ANYDATASET`)
- Media types (`ORDSYS.ORDAudio`, `ORDSYS.ORDImage`, `ORDSYS.ORDImageSignature`, `ORDSYS.ORDVideo`, `ORDSYS.ORDDoc`, `SI_StillImage`, `SI_Color`, `SI_AverageColor`, `SI_ColorHistogram`, `SI_PositionalColor`, `SI_Texture`, `SI_FeatureList`)
- Spatial types (`MDSYS.SDO_GEOMETRY`, `SDO_TOPO_GEOMETRY`, `SDO_GEORASTER`)
- Uniform Resource Identifier (URI) Types

## 5.7.2 Datatypes for Microsoft SQL Server Replication

Supported and unsupported datatypes for replicating into and out of Microsoft SQL Server.

### Replicating Datatypes into Microsoft SQL Server

These SAP datatypes are supported or unsupported by ECDA 15.0.1 and later for replicating into Microsoft SQL Server.

Table 9: ECDA Supported and Unsupported SAP Datatypes

Datatype	Supported	Unsupported
SAP	<code>bigint</code>	<code>bigdatetime</code>

Datatype	Supported	Unsupported
	integer	bigint
	smallint	
	tinyint	
	decimal	
	numeric	
	unsigned bigint	
	unsigned integer	
	unsigned smallint	
	unsigned tinyint	
	unichar	
	univarchar	
	unitext	
	float	
	double	
	real	
	money	
	smallmoney	
	date	
	time	
	datetime	
	smalldatetime	
	timestamp	
	char	
	nchar	
	varchar	

Datatype	Supported	Unsupported
	nvarchar	
	text	
	binary	
	varbinary	
	image	
	bit	
	sysname (same as varchar(30))	
	longsysname (same as varchar(255))	
	UDDs (as underlying type)	

These Microsoft SQL Server datatypes are supported or unsupported by ECDA 15.0.1 and later for replicating into Microsoft SQL Server.

Table 10: ECDA Supported and Unsupported Microsoft SQL Server Datatypes

Datatypes	Supported	Unsupported
Microsoft SQL Server	bigint	cursor
	nchar	date
	nvarchar	datetime2
	ntext	datetimeoffset
	varchar (max) (only for replication not gateway)	filestream
	nvarchar (max) (only for replication not gateway)	geography
	sql_variant	geometry
	binary	hierarchyid
	bit	large UDDs
	char	table
	datetime	time
	decimal	xml

Datatypes	Supported	Unsupported
	float	
	image	
	integer	
	money	
	numeric	
	real	
	smalldatetime	
	smallint	
	smallmoney	
	text	
	timestamp	
	tinyint	
	uniqueidentifier	
	varbinary	
	varbinary (max) (only for replication, not gateway)	
	varchar	

### **i** Note

Replication Agent supports partial update replication for the Microsoft SQL Server `max` datatypes when the replicate database is Microsoft SQL Server.

## Replicating Datatypes out of Microsoft SQL Server

These Microsoft SQL Server datatypes are supported or unsupported by Replication Agent for replicating out of Microsoft SQL Server.

Table 11: Replication Agent Supported and Unsupported Microsoft SQL Server Datatypes

Datatypes	Supported	Unsupported
Microsoft SQL Server	bigint	cursor
	date	filestream
	datetime2	geography
	datetimeoffset	geometry
	nchar	hierarchyid
	nvarchar	large UDDs
	ntext	table
	varchar (max) (replicate must be Microsoft SQL Server)	time
	nvarchar (max) (replicate must be Microsoft SQL Server)	xml
	sql_variant	
	binary	
	bit	
	char	
	datetime	
	decimal	
	float	
	image	
	integer	
	money	
	numeric	
	real	
	smalldatetime	
	smallint	

Datatypes	Supported	Unsupported
	smallmoney	
	text	
	timestamp	
	tinyint	
	uniqueidentifier	
	varbinary	
	varbinary (max) (replicate must be Microsoft SQL Server)	
	varchar	

### 5.7.3 Datatypes for IBM DB2 UDB Replication

Supported and unsupported datatypes for replicating into and out of IBM DB2 UDB.

#### Replicating Datatypes into IBM DB2 UDB

These SAP datatypes are supported or unsupported by ECDA 15.0.1 for replicating into IBM DB2 UDB.

Table 12: ECDA Supported and Unsupported SAP Datatypes

Datatype	Supported	Unsupported
SAP	bigint	bigdatetime
	integer	bigtime
	smallint	image
	tinyint	text
	decimal	unitext
	numeric	
	unsigned bigint	

Datatype	Supported	Unsupported
	unsigned integer	
	unsigned smallint	
	unsigned tinyint	
	unichar	
	univarchar	
	float	
	double	
	real	
	money	
	smallmoney	
	date	
	time	
	datetime	
	smalldatetime	
	timestamp	
	char	
	nchar	
	varchar	
	nvarchar	
	binary	
	varbinary	
	bit	
	sysname (same as varchar(30))	
	longsysname (same as varchar(255))	
	UDDs (as underlying type)	

These IBM DB2 UDB datatypes are supported or unsupported by ECDA 15.0.1 for replicating into IBM DB2 UDB.

Table 13: ECDA Supported and Unsupported IBM DB2 UDB Datatypes

Datatypes	Supported	Unsupported
IBM DB2 UDB	bigint	blob
	graphic	clob
	vargraphic	dbclob
	decfloat (for replication only, not gateway)	long varchar
	smallint	long vargraphic
	float	ROWID
	integer	long varchar for bit data
	decimal	xml
	real	UDDs
	double	
	time	
	timestamp	
	date	
	char	
	varchar	
	char for bit data	
	varchar for bit data	

### **i** Note

The `decfloat` datatype is supported only in a replication environment (not for gateway or any other ECDA use).

## Replicating Datatypes out of IBM DB2 UDB

These IBM DB2 UDB datatypes are supported or unsupported by Replication Agent for replicating out of IBM DB2 UDB.



Table 14: Replication Agent Supported and Unsupported IBM DB2 UDB Datatypes

Datatypes	Supported	Unsupported
IBM DB2 UDB	bigint	ROWID
	char	UDDs
	char for bit data	xml
	blob	
	clob	
	date	
	dbclob	
	decfloat	
	decimal	
	double	
	float	
	graphic	
	integer	
	long varchar	
	long varchar for bit data	
	long vargraphic	
	real	
	smallint	
	time	
	timestamp	
	varchar	
	varchar for bit data	
	vargraphic	

## IBM DB2 UDB 9.5 and 9.7 Support Limitations

Replication Agent does not support these features of IBM DB2 UDB 9.5 or 9.7:

- Replication of `XML` datatype

### **i** Note

Since Replication Agent does not support replicating XML, restrictions have been imposed on marking a table that contains XML columns. Replication Agent generates an error message each time an attempt is made to mark a table with XML columns. To replicate all but the XML columns of a table, use the `force` option when marking the table for replication.

- When replicating `DECFLOAT` columns from UDB to other databases that do not support `DECFLOAT` or an equivalent datatype, `DECFLOAT` is mapped to `FLOAT`, which may cause a loss of precision.
- Replication Agent does not support replication of `DECFLOAT` special values such as positive and negative INFINITY, NAN, and SNAN. Replication Agent replicates these values to NULL if the column is nullable, or 0.0 if the column is not nullable.

## 5.8 Unsupported Functionalities

Functionality are not supported by Replication Server Options 15.7.1.

### **i** Note

Only features and functionality included in the Replication Server Options documentation are supported for a given solution. If a feature is not documented, it is not supported.

### General Functionality

- IPv6-formatted addresses
- 4KB-sector disk drives
- Replication Server `rs_init` utility (for non-ASE databases)
- Replication Server `rs_subcomp` utility (for non-ASE databases)
- Replication Server when replicating in an environment where other vendors are replicating (for non-ASE databases)

### Oracle-Related Functionality

- Oracle-packaged stored procedures and functions (standalone procedures and functions are supported)

- 
- Oracle virtual columns
  - Oracle label security
  - Custom function strings for text and image processing with ECO – see the *Replication Server Heterogeneous Replication Guide*.

## IBM DB2 UDB-Related Functionality

- IBM DB2 Universal Database stored procedures
- IBM DB2 clients and servers of different versions on different machines – if your IBM DB2 client is installed on a different operating system than your IBM DB2 server, both the client and server must be of the same version.

## Microsoft SQL Server-Related Functionality

- Microsoft SQL Server virtual computed columns
- Replication Agent does not support these features of Microsoft SQL Server 2008:
  - Transparent data encryption (TDE)
  - Procedures with table-valued parameters (TVPs)
  - Sparse column and column set
  - MERGE SQL statement

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