



Authorization Database Operations

Detailed information about databases used by
Tilana RealCDP[™] server software and **Tilana Client**[™]
How each is created, accessed, used, and updated.

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We bring true value to cloud storage, by providing continuous data protection, permanent archival, web & mobile access, version history, and multi-computer synchronization on one balanced, quickly deployed, versatile, and extensible online CDP data protection and synchronization platform.

Storage systems built on the Tilana Cloud platform provide end users the best kind of data protection, with true real time CDP (continuous data protection), automated multi-computer content synchronization, and secure remote archive, with unlimited version history that enables instant any-point-in-time content recovery from PCs, Web browsers, and mobile devices.

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Tilana Authorization Database Operations

Theory of Operation

Tilana RealCDP uses the authorization database for three purposes.

1. **Authentication** – The authorization database contains authentication information, which controls access to secure storage on the Tilana RealCDP enabled server.
2. **Location** – The authorization database directs the Tilana RealCDP server software to one or more storage databases, which contain metadata and file data for a Tilana data protection, sync, and archive account.
3. **Statistics** – The authorization database contains account metrics, such as the number of files and quota utilization, which is periodically updated by the Tilana RealCDP server software.

Every Tilana Client user session begins with a connection to the authorization database. When the client executes the **auth server** command, the server software connects to the authorization database, authenticates the client, and receives a list of storage databases used by the account.

Database Security

Tables and stored procedures in the authorization database are both owned by the **dbo** database user. The server connects to the authorization database as the unprivileged users **tl_auth** and **tl_admin**, and accesses the database tables thru the execution of stored procedures to which it has explicitly been granted EXEC privileges.

The **tl_auth** login is used when the server software is executing commands on behalf of an end user.

The **tl_admin** login is used when the server software has an authenticated administrative connection (validated by an SSL client certificate) and is executing an administrative command, such as **allocate_account** or **account_set_quota**.

Creation and Initialization

Creating the physical authorization database is best done manually for a production environment. This is accomplished in the same manner in which any SQL Server 2005 database is created.

Initialization of the authorization database is accomplished by using the Tilana-provided SQL script **dbcreate_auth.sql**. This script will create all tables, indices, stored procedures, and logins, and will initialize security permissions on the stored procedures.

dbcreate_auth.sql as delivered from Tilana contains a generic CREATE DATABASE statement to initialize a basic database for testing purposes. If you have already created the database, this statement must be commented out or removed.

In addition, if the authorization database is created with a name other than **tilana**, you must replace all occurrences of the word **tilana** with the actual database name. As of this writing, there is a USE statement and two EXEC sp_addlogin statements that reference the database name.

Upgrading

Tilana will periodically update the server software in a way that will require changes in the authorization database schema. When this occurs, Tilana will provide you with one or more update scripts to modify the schema as well as detailed instructions.

Storage Databases

The authorization database stores information about all active storage databases in the table **Servers**.

Servers	
PK	<u>id</u>
-	<u>name</u>
-	<u>dsn</u>
-	<u>active</u>
-	<u>accounts_max</u>
-	<u>accounts_cur</u>

<i>id</i>	Unique numeric identifier for the server. Used as a foreign key in the <i>AccountXServer</i> table.
<i>name</i>	Textual name of the server. For identification purposes only.
<i>dsn</i>	The ODBC data source used to connect to the database. This data source must exist on all of the request processing computers in the datacenter.
<i>active</i>	Boolean value enabling or disabling allocation of new accounts on this server. Affects new account allocation only.
<i>accounts_max</i>	The maximum number of accounts that should be allocated to this server. The Tilana Reserve server software will only allocate additional accounts beyond this point when there are no other suitable servers available.
<i>accounts_cur</i>	The current number of accounts allocated to this server. This value is maintained by the Tilana RealCDP server software.

When a new storage account is created, the stored procedure ***tl_SelectServer*** selects the storage database with the most “headroom”. Specifically, it selects the storage database with the largest difference between its ***accounts_max*** and ***accounts_cur*** values. This provides a rudimentary round-robin assignment mechanism for accounts, but does not take into account the amount of storage space used by those accounts. Therefore, the ***accounts_max*** value for a given storage database should be based on the average size of an account and the available space on the server, rather than other available resources (CPU, RAM, etc...).

Adding a Storage Database

A storage database is created and initialized in much the same manner as the authorization database. After creating an empty SQL Server 2005 database, the Tilana-provided SQL script ***dbcreate_cdp.sql*** is run. This will create a database login, ***tl_cdp***, and several stored procedures used during the account allocation process.

dbcreate_cdp.sql as delivered from Tilana contains a generic CREATE DATABASE statement to initialize a basic database for testing purposes. If you have already created the database, this statement must be commented out or removed.

In addition, if the storage database is created with a name other than ***tilana***, you must replace all occurrences of the word ***tilana*** with the actual database name. As of this writing, there is a USE statement and two EXEC sp_addlogin statements that reference the database name.

After the storage database has been created and initialized, a single record referencing the new database must be inserted into the ***Servers*** table of the authorization database:

```
INSERT INTO Servers ( id, name, dsn, active, accounts_cur, accounts_max ) VALUES ( <id>,
'<name>', '<dsn>', 1, 0, <accounts_max> );
```

Tilana Reserve will begin allocating new accounts to the new storage database using the round-robin scheme described above.

Account Spanning

While it is not a recommended practice, a single Tilana Reserve account may store its data on more than one storage server. This allows accounts on a server running near its storage capacity to continue to grow and function normally without requiring wholesale transfer of account data from one server to another.

Tilana Reserve separates account data into two categories.

1. **Metadata** is all account information except physical file data
2. **Storage data** is the physical file data stored in the **FileParts** table

The metadata for an account can only be stored in a single storage database. The storage data may be contained in one or more storage databases, and may coexist with the metadata in a single storage database (this is the default configuration when a new account is allocated).

The storage databases used by a storage account are controlled by the **AccountXServer** table in the authorization database.

AccountXServer	
FK1	account_id
FK2	server_id
	login
	password
	purpose

account_id Unique numeric identifier of the account, foreign key reference to the **Accounts** table.

server_id Unique numeric identifier of the server, foreign key reference to the **Servers** table.

login The SQL Server login for this account in the referenced storage database.

password The SQL Server password for this account in the referenced storage database.

purpose Bit field that controls the way Tilana RealCDP uses this storage database. See below for details.

The **purpose** field controls the type of data that Tilana RealCDP stores in each storage database associated with an account. This field is a combination of the following numeric values:

```
#define CDP_SERVER_PURPOSE_METADATA      0x01
#define CDP_SERVER_PURPOSE_STORAGE_ATTACHED 0x02
#define CDP_SERVER_PURPOSE_STORAGE_CURRENT 0x04
```

Account Spanning (continued)

There must always be at least one storage database associated with an account of each type. An “attached” storage database is a database that contains storage data, but is no longer being used for new storage data. The “current” storage database is the database in which new storage data is stored. By convention, whenever a storage database is marked as the “current” storage database, it should also be marked as an “attached” storage database.

Use the following procedure to configure spanning for an existing account:

1. Connect to the new storage database as **tl_cdp** or **sa** and execute the **tl_CreateUser** stored procedure:

```
EXEC tl_CreateUser @login = '<login>', @password = '<password>'
```

It is recommended, but not required, that you use the same storage database login and password across all spanned storage databases.

2. Connect to the new storage database using the login and password from step 1, and execute the Tilana-provided SQL script **dbcreate_spanning.sql**.
3. Insert a new record into the **AccountXServer** table for the account and new storage database, using a purpose of 6 (STORAGE_ATTACHED + STORAGE_CURRENT).
4. Clear the STORAGE_CURRENT flag from the previous **AccountXServer** record for the account by subtracting 4 from the **purpose** value.

After enabling spanning for an account, new file data will begin to be stored in the newly attached storage database.

Database Restoration

Tilana RealCDP uses a separate user schema for each account in the storage databases. Each schema has its own login, identified by a password, and an associated SQL server user.

When a storage database is restored from a backup or otherwise recovered from failure, SQL Server will restore the user records, but will not recreate the associated logins. This process must be done semi-manually. The authorization database contains the storage database logins and passwords in the table **AccountXServer**, and the system stored procedure **sp_change_users_login** can be used to reattach the logins and users.

The following SQL statement can be run on the authorization database to generate an SQL script to fix all of the logins for a given storage database, replacing **<id>** with the unique identifier of the storage server that was restored.

```
SELECT 'EXEC sp_change_users_login @Action="Auto_Fix", @UserNamePattern="' + login +  
'", @Password="' + password + ''' FROM AccountXServer WHERE server_id = '<id>'
```

The resulting SQL script can then be run on the restored storage database to repair the logins for individual accounts.

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