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Technical FAQ: Btrieve – Microsoft SQL Server

Migration and Deployment

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Introduction

Mertech's Btr2SQL database migration tool smoothly migrates a Btrieve database to a Microsoft SQL Server back-end. The migration process creates the required tables and indexes and copies data to the MSSQL server. This white paper answers frequently asked questions about the migration and deployment process.

What objects are created on MSSQL?

Indexes

If a table has at least one index that is not unique and the table does not have a primary key defined in the DDFs:

- The *MDS_RECNUM* column is a primary key. *MDS_RECNUM* is added as the last segment to any index that is not already unique. Thus, **all** indexes are created as unique. This guarantees proper record traversal forward and backwards through otherwise duplicate values.

If a table has a primary key and has indexes that are not unique, the segments of the primary key are appended to the non-unique keys to make them unique.

Application Locks

Btrieve allows an application to lock records outside of a transaction. This is counter-intuitive to an SQL database and conflicts with normal transaction processing. Therefore, the standard server record locks cannot be used. Instead, the driver utilizes an App Locks package and manages its own record locks.

Locks are acquired through *getapplock* and individual locks are released with *releaseapplock*. When a table is closed or a transaction is ended, a large number of locks may be needed to be released. This falls to the *mds_release_locks_v1* stored procedure, which is automatically created by the migration utility. If you create the database manually, you need to create this stored procedure:

```
create procedure mds_release_locks_v1
    @lockList varchar(8000)
with execute as caller as
    -- lockList is a comma separated list of lock IDs
    -- returns the number of locks that released successfully
    declare @lockResource varchar(50);
    declare @startPos int;      set @startPos = 0;
    declare @endPos int;
    declare @lockStatus int;
    declare @numReleased int;  set @numReleased = 0;

    while @startPos <= len(@lockList)
    begin
        -- parse lock list
        set @endPos = charindex(',', @lockList, @startPos);
        if @endPos = 0 set @endPos = len(@lockList) + 1;
        set @lockResource = substring(@lockList, @startPos, @endPos - @startPos);
        print @lockResource;

        -- Do the release
        exec @lockStatus = sp_releaseapplock @Resource=@lockResource,
            @LockOwner='Session', @DbPrincipal='public'
```

```

if @lockStatus = 0
    set @numReleased = @numReleased + 1;

set @startPos = @endPos + 1;
end;

return @numReleased;

```

Are there recommended database settings?

Recovery Model

It is suggested that you set the recovery model to **bulk-logged**, which offers the best tradeoff of performance and log space usage versus safety.

Isolation Level

Certain features in the driver are reliant on the **snapshot isolation** level. If another mode is used, it is possible for an application to hang – one client id is waiting on a locked record from another client id (from the same process).

The migration tool runs these commands to set the isolation level on the database. If the migration tool is not utilized, you should run these commands manually:

```

ALTER DATABASE <db> SET ALLOW_SNAPSHOT_ISOLATION ON
ALTER DATABASE <db> SET READ_COMMITTED_SNAPSHOT ON

```

To check the current mode of the database, run the SQL command: DBCC USEROPTIONS.

Which files are used?

For each Btrieve data file, a corresponding interface file (.INT) is created. For example, 'filename_ext.INT' is generated for 'filename.ext'. The INT file contains metadata used at runtime and resides in the location where the original data file was located. The original Btrieve data file is no longer needed.

The Pervasive.SQL/Btrieve engine is only used by the migration tool. The Pervasive.SQL engine can be shut down after the data migration is performed.

What roles and privileges are required?

The user ID identified for the migration process must have the DB_OWNER role. Users running deployed applications and accessing the MSSQL database must have:

- The PROCESS privilege (required by the App Locks package)
- Object creation rights if the applications create tables on the fly (e.g., temp tables)

Can I determine the number of licenses used?

You can use the following query to see how many licenses are in use by the Merteck driver. If this number exceeds the count provided by the license file, the driver will fail to run:

```

select * from master.dbo.sysprocesses where program_name like 'SQL_BTR%'

select count(distinct(net_address + left(program_name,len(program_name)-14))) from
master.dbo.sysprocesses where program_name like 'SQL_BTR-%'

```

How do I install the client?

Each workstation accessing the SQL database must have the Microsoft SQL Native Client installed (see <http://msdn.microsoft.com/en-us/data/aa937733.aspx> for more information). Currently there are three acceptable versions:

- MSSQL Server 2008 R2 SP2 <http://www.microsoft.com/en-us/download/details.aspx?id=30440>
- MSSQL Server 2012 <http://www.microsoft.com/en-us/download/details.aspx?id=29065>
- MSSQL Server 2012 SP1 <http://www.microsoft.com/en-us/download/details.aspx?id=35580>

What things should I look for in my code?

Look for calls to `B_CREATE` and / or file deletion through OS calls.

`B_CREATE` is supported; however the table will not be fully defined in SQL. This can be overcome with application modification to utilize either the `MdsAddTable` function or by using an INT file Template (for additional information see the Btr2SQL blog titled [Using BTR2SQL's PERMANENT INT option with B_CREATE](#)).

Many apps create "temp" files for sorting and other short-lived purposes or create new files each quarter/year. Instead of removing the temp file using an OS call, utilize `MdsDropTable` (or `B_DROP_FILE`).

There is also a `B_TRUNCATE_FILE` API if the application simply wants to delete all the records. This is much faster than the usual Btrieve method of read/delete each record and avoids dropping the table, which may have adverse effects on the defined tablespaces.

How do I know if I am targeting Btrieve or SQL?

The normal approach to access the Btrieve DLL is either through the import library provided by Pervasive or a `LoadLibrary("w3btrv7.dll")`. Windows finds the dll on the PATH and loads it. How can you tell if the Pervasive or the Mertech dll was loaded?

Use `'B_EXTENDED_VERSION'` (op 5026) to retrieve information about the Mertech driver or attached SQL back-end. The Extended Version function can do two things: retrieve information about the Mertech driver (version, dll name, etc) or retrieve a version string from the active SQL server. Making this call against the Pervasive access dll causes a return code of 1, which is a useful way to know if your application is running against a Btrieve or a SQL back-end.

Can the application control login?

`B_SQL_LOGIN` and `B_SQL_LOGOUT` allow the application to avoid the login dialog and fully hide the user credentials used for accessing the database. This is documented in the SDK portion of the User Guide.

Can the application execute queries?

`B_SQL_*` functions allow execution of SQL queries and results retrieval on the same connection as the driver. This is documented in the SDK portion of the User Guide.

How do I handle sensitive data?

Most applications have a few tables of data that are more "sensitive" than others. This includes user and password information for logging in to the application, registration codes, medical information, etc. Since Btrieve files must be accessible to the user running the application, the data is also accessible.

To protect sensitive data, Btrieve provides encrypted file format. How do you handle encrypted files when migrating to MSSQL?

First, keep in mind that SQL tables do not require direct access by users. In other words, your application can be given a login that only it knows so users cannot access the data directly; they can only access the data through the application. Additionally, security options available in MSSQL server can ensure the data is safer in the SQL tables than it was under Btrieve. For these reasons, most administrators do not encourage the use of table encryption.

Security concerns also exist when accessing sensitive data through Pervasive.SQL (using ODBC, Ole-DB, etc), which requires tables to be defined in the DDFs. Some applications choose not to define the sensitive tables in the DDFs but instead leave them strictly to Btrieve access with an owner name.

Data files that are not defined in the DDFs are not migrated to the SQL server. How do you handle files with missing DDFs? There are several approaches to resolve this problem.

1. Define the missing DDFs. You do not have to define each field, you can leave most of the record as a binary. Only the indexed fields must be properly defined.

However, perhaps you intend to continue shipping the same DDFs to Btrieve customers and do not want the tables to be included. In this case:

2. Backup the current DDFs and separately define the secure tables. You then have to maintain two sets of DDFs.
3. Create a blank set of DDFs in another folder (that does not ship to customers). Define only the secure tables in this folder. You then have to migrate both sets of tables to the SQL server.

An additional way to ensure security for the sensitive tables is to migrate them to a different database or schema. Whether the tables are all defined in one or two sets of DDFs, you can migrate them to a different database on the SQL server. This does not change the security of the data, since logins can control access to the tables, but it does clearly partition the data and makes it easier to know which tables must have tighter security control.

How do I look at the data on the server?

Now that the Pervasive Control Center is gone, how do I look at the data on the server? There are many tools that enable the user to execute queries, edit data, modify table structures, import/export, etc.

The usual method is the Microsoft SQL Server Management Studio that ships with SQL Server. There are also many tools available for purchase online. One such tool is Aqua Data Studio - <http://www.aquafold.com/>

Contact Information

If you would like to know more about Merteck's products, please visit our website at <https://www.mertechdata.com/> or contact us at the addresses below. Pre-sales consultations are free!

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