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Microsoft SQL Server 2008 - Change Data Capture – Part I

January 11, 2008

One of the new features in Microsoft SQL Server 2008 is the ability to track changes on a table. You can enable change tracking on a table using the Change Data Capture feature.

Part one of this series illustrates how to enable Change Data Capture on a database, and on a table, and how to keep track of Data Definition Language changes on a table.

Note: This article is written based on the SQL Server 2008 – Nov CTP.

Step 1

Let's create a database named MyDataBase as shown below. [Refer Fig 1.0]

```
USE [master]
GO

/*** Object:  Database [MyDataBase]    Script Date: 01/07/2008 18:46:15 ***/
IF  EXISTS (SELECT name FROM sys.databases WHERE name = N'MyDataBase')
DROP DATABASE [MyDataBase]
GO
USE [master]
GO

/*** Object:  Database [MyDataBase]    Script Date: 01/07/2008 18:46:33 ***/
CREATE DATABASE [MyDataBase]
GO
```

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Fig 1.0

Step 2

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Now let's create a table named MyTable on the MyDataBase database, as shown Below. [Refer Fig 1.1]

```
USE [MyDataBase]
GO

/*** Object:  Table [dbo].[MyTable]    Script Date: 01/07/2008 18:52:14 ***/
IF  EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[MyTable]')
          AND type in (N'U'))
DROP TABLE [dbo].[MyTable]
GO
USE [MyDataBase]
GO

/*** Object:  Table [dbo].[MyTable]    Script Date: 01/07/2008 18:52:26 ***/
SET ANSI_NULLS ON
GO

SET QUOTED_IDENTIFIER ON
GO

SET ANSI_PADDING ON
GO

CREATE TABLE [dbo].[MyTable](
          [ID] [int] NOT NULL,
          [Name] [varchar](100) NULL,
 CONSTRAINT [MyTable_PK] PRIMARY KEY CLUSTERED
(
          [ID] ASC
)WITH (PAD_INDEX  = OFF, STATISTICS_NORECOMPUTE  = OFF,
          IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS  = ON,
          ALLOW_PAGE_LOCKS  = ON) ON [PRIMARY]
) ON [PRIMARY]

GO

SET ANSI_PADDING OFF
GO
```

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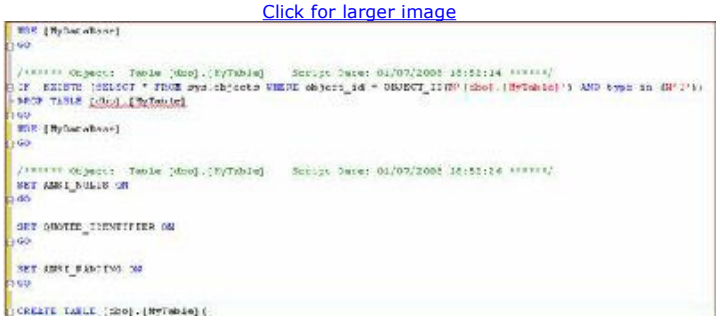

Fig 1.1

Step 3

In order to track changes on the table, we need to enable the Change Data Capture feature on the database. We can enable the Change Data Capture feature using the following Transact SQL command, as shown below. [Refer Fig 1.2]

Until this point, the only schema that exists on the database is dbo. Once we enable Change Data Capture, a new schema with a bunch of objects will be created.

```
USE [MyDataBase]
GO
EXEC sys.sp_cdc_enable_db_change_data_capture
GO
```

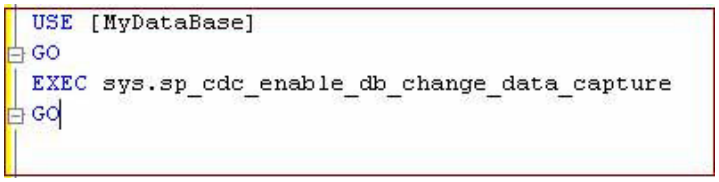

Fig 1.2

The following CDC tables are created under the CDC schema, as shown below. [Refer Fig 1.3]

```
cdc.captured_columns
cdc.change_tables
cdc.ddl_history
cdc.index_columns
cdc.lsn_time_mapping
```

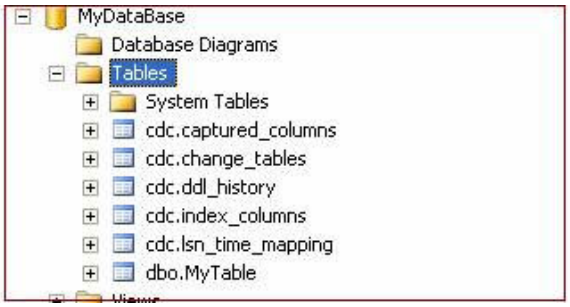

Fig 1.3

When you query these tables, you will see only zero number of rows. [Refer Fig 1.4]

```
select * from cdc.captured_columns
select * from cdc.change_tables
select * from cdc.ddl_history
select * from cdc.index_columns
select * from cdc.lsn_time_mapping
```

Result

```
home\sql2008(HOME\MAK): (0 row(s) affected)
home\sql2008(HOME\MAK): (0 row(s) affected)
home\sql2008(HOME\MAK): (0 row(s) affected)
home\sql2008(HOME\MAK): (0 row(s) affected)
home\sql2008(HOME\MAK): (0 row(s) affected)
```

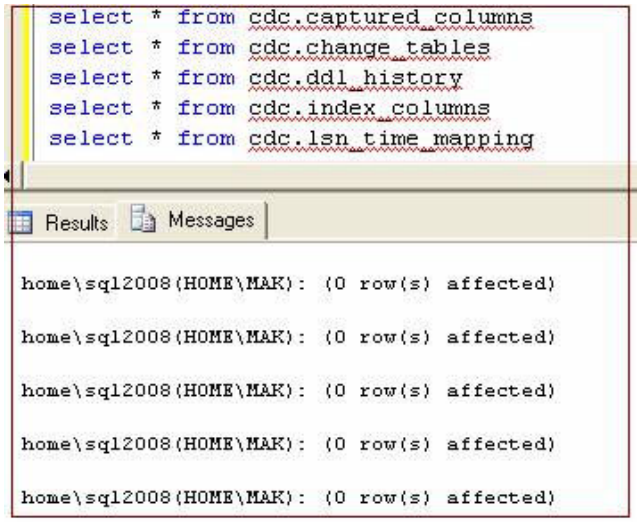

Fig 1.4

Step 3

In order to track changes on the table, we need to enable the Change Data Capture feature on the table as well. Let's enable the Change Data Capture feature using the following Transact SQL command, as shown below. [Fig 1.5]

```
USE [MyDataBase]
GO
EXEC sys.sp_cdc_enable_table_change_data_capture
@source_schema = 'dbo',
@source_name = 'MyTable',
```

```
@role_name = 'cdc_MyTable'
GO
```

Result

```
home\sql2008(HOME\MAK):
Job 'cdc.MyDataBase_capture' started successfully.
home\sql2008(HOME\MAK):
Job 'cdc.MyDataBase_cleanup' started successfully.
```

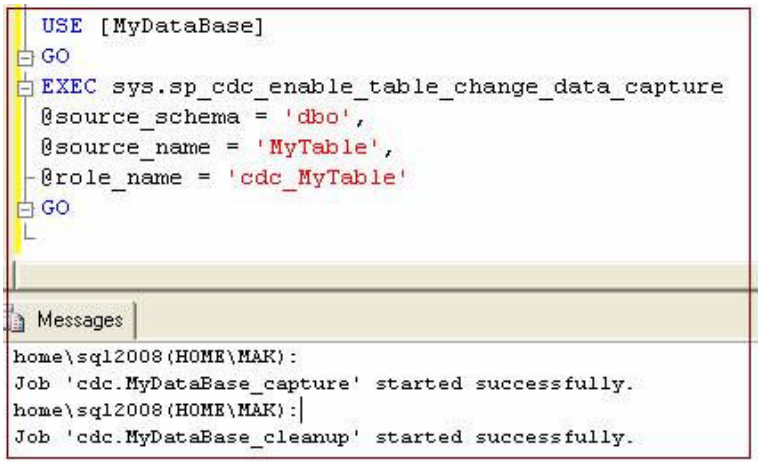

Fig 1.5

By reading the result, we can easily understand that SQL Server Agent is a must to do the capture and cleanup. We can see these jobs are actually created as SQL Server Scheduled jobs. [Refer Fig 1.6, 1.7]

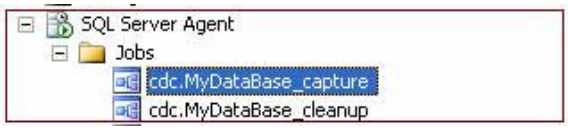

Fig 1.6

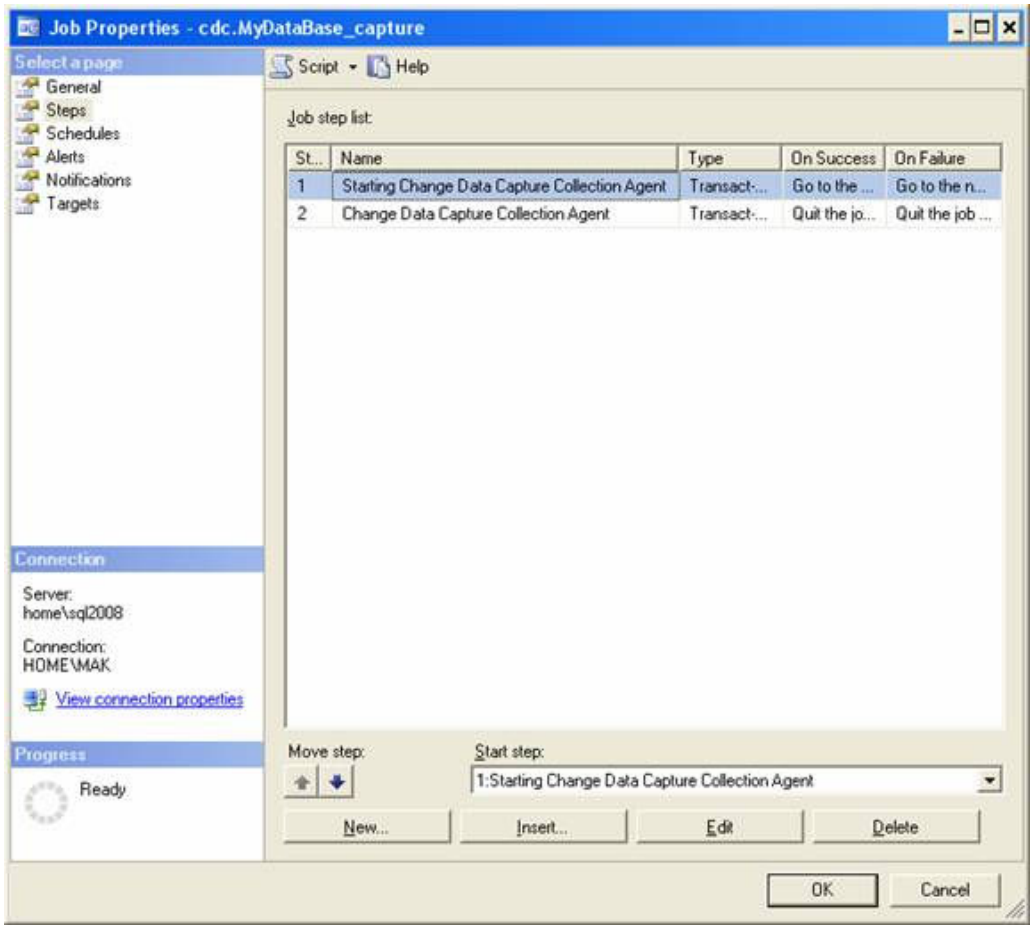

Fig 1.7

Now let's execute the following Transact SQL to see if any data has been inserted on any of the CDC tables.

```
select * from cdc.captured_columns
select * from cdc.change_tables
select * from cdc.index_columns
```

Result

```
object_id, column_name, column_id, column_type, column_ordinal, is_computed
389576426, ID, 1, int, 1, 0
389576426, Name, 2, varchar, 2, 0

home\sql2008(HOME\MAK): (2 row(s) affected)

object_id,  version,  source_object_id, capture_instance, start_lsn, end_lsn, supports_net_changes, has_drop_pending,
        role_name, index_name, filegroup_name, create_date
389576426, 0, 53575229, dbo_MyTable, NULL, NULL, 0, NULL, cdc_MyTable, MyTable_PK, NULL, 2008-01-07 19:05:49.733

home\sql2008(HOME\MAK): (1 row(s) affected)

object_id, column_name, index_ordinal, column_id
389576426, ID, 1, 1

home\sql2008(HOME\MAK): (1 row(s) affected)
```

You can see that the CDC schema stores metadata information about which tables and columns are being tracked by Change Data Capture. It also stores information about what Index the table that has been tracked has.

Step 4

We can check to see if Change Data Capture is enabled on a database by using the following transact

SQL statement.

```
SELECT is_cdc_enabled FROM sys.databases WHERE name = 'MyDataBase'
```

Result

```
is_cdc_enabled
--------------
1

home\sql2008(HOME\MAK): (1 row(s) affected)
```

Step 5

We can check to see if Change Data Capture is enabled on a table, by using the following transact SQL statement.

```
SELECT is_tracked_by_cdc FROM sys.tables WHERE name = 'MyTable'
```

Result

```
is_tracked_by_cdc
-----------------
1

home\sql2008(HOME\MAK): (1 row(s) affected)
```

Step 6

Now let's make some changes to table structure and see if Change Data Capture captures the changes. Execute the following query as shown below. [Refer Fig 1.8]

```
USE [MyDataBase]
GO
Alter Table MyTable add Address varchar(500)
GO
Alter Table MyTable add Salary money
GO
Alter Table MyTable add Bonus money
GO
```

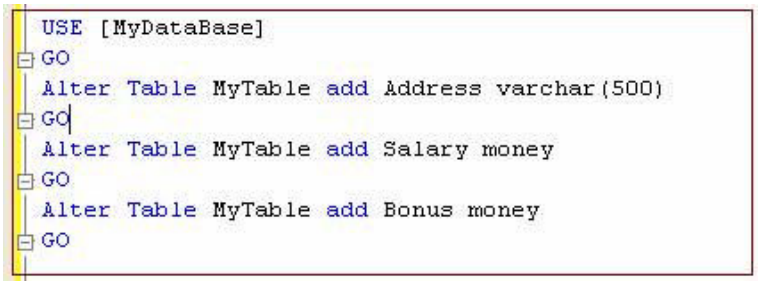

Fig 1.8

Query the cdc table ddl_history as shown below. [Refer Fig 1.9]

```
select * from cdc.ddl_history
```

Result

```
source_object_id, object_id, required_column_update, ddl_command, ddl_lsn, ddl_time
53575229, 389576426, 0, Alter Table MyTable add Address varchar(500)
, 0x0000001C000001350001, 2008-01-07 19:23:00.000

53575229, 389576426, 0, Alter Table MyTable add Salary money
, 0x0000001C000001370018, 2008-01-07 19:23:00.000

53575229, 389576426, 0, Alter Table MyTable add Bonus money
, 0x0000001C0000013D0018, 2008-01-07 19:23:00.000

home\sql2008(HOME\MAK): (3 row(s) affected)
```

```
select * from cdc.ddl_history
```

Results | Messages

source_object_id	object_id	require...	ddl_command	ddl_lsn	ddl_time
53575229	389576426	0	Alter Table MyTable add Address varchar(500)	0x0000001C000001350001	2008-01-07 19:23:00.000
53575229	389576426	0	Alter Table MyTable add Salary money	0x0000001C000001370018	2008-01-07 19:23:00.000
53575229	389576426	0	Alter Table MyTable add Bonus money	0x0000001C0000013D0018	2008-01-07 19:23:00.000

Fig 1.9

Note: This article is written based on the SQL Server 2008 – Nov CTP.

Conclusion

This article illustrated how to enable the new SQL Server Feature "Change Data Capture" on a database. In addition, it illustrated how to enable Change Data Capture on a table and how to keep track of Data Definition Language changes on a table. It also explained the CDC schema and changes happening in the objects of the CDC schema.

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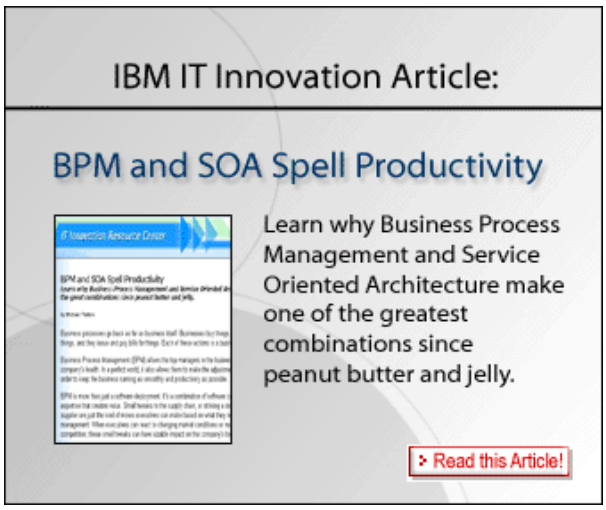

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