

Progress to MS SQL Server conversion routines

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Pro2MS

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Product Overview

Pro2My is a simple group of PROGRESS source code routines that can be run against any PROGRESS database to produce a series of files containing MSSQL format SQL statements. These files can be used to produce a MSSQL database that is a mirror of the PROGRESS database. The routines provide a method of:

- Extracting the data schema from the PROGRESS database
- Checking and converting PROGRESS data to prevent MS SQL database load errors.
- Extracting the data from the PROGRESS database.
- Extracting the Security information from the database schema.
- Importing the schema, data and security into MSSQL using SQL commands from a tool such as the SQL Server management console .

System Requirements

PROGRESS

The Pro2My conversion routines dynamically create and run PROGRESS programs. They also include routines that update data in the database. To run these routines, a PROGRESS development license version 6 or higher be installed on the machine from which the routines are run.

The client should be started with the "-tok 1600 -inp 32000" parameters.

SQL Server

The Pro2My programs are qualified against SQL versions 2000+

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Transferring the Schema

Chapter

2

The schema dump routines are designed to create an SQL file that can be used to create a SQL database of the same name with the same tables.

Limitations of the schema dump

There are certain limitations of the schema dump, mostly related to limitations of the MSSQL database.

1. SQL Server recommends a NON-NULL, UNIQUE, primary key. In order to ensure this, the Pro2MS routines create a new primary index based on the PROGRESS recid. This ensures that the data is loaded cleanly into MSSQL, but requires specific routines to manage after the data is converted. An alternative approach would be to create an auto-increment variable for the primary index.
2. View information is currently ignored.
3. The dump routines do not distinguish between 4GL and SQL tables.
4. Extended information in PROGRESS version 9 (SYS tables) is ignored.
5. Tables with a large number of fields may cause the PROGRESS client to fail. There is no current resolution for this problem.

Data Type Conversion

Note that integer and decimal conversions are determined based on the display format in the dictionary, not just on the data type. If the database contains values in an integer or decimal field that is greater than the display format, the data may fail to load into the MSSQL database because the field type will have been defined too small.

Progress data type	MSSQL data type	Notes
<i>Character</i> with a field length less than or equal to 255	<i>Varchar</i> of equivalent size	
<i>Character</i> with a field length greater than 255 characters.	<i>Text</i>	See also MSSQL BLOB format
<i>Date</i>	<i>Date</i>	MSSQL dates are stored in ISO format. A PROGRESS <i>Date</i> field could easily be migrated to a MSSQL <i>Datetime</i> field for additional functionality.
<i>Logical</i>	<i>Tinyint</i>	False = 0 True = 1.
<i>Decimal</i>	<i>Decimal</i>	
<i>Integer</i> less than 3 digits	<i>Tinyint</i>	
<i>Integer</i> between 3 and 6 digits	<i>Smallint</i>	

<i>Integer</i> over 6 digits	<i>Integer</i>	
<i>Recid (Version 9)</i>	<i>Bigint</i>	
<i>Raw</i>	<i>Blob</i>	The data in raw fields is currently not converted.

Index conversion.

There are some specific index conversion items

1. The creation of a new non-null primary key (see above).
2. Indexes that contain elements of arrays are ignored.
3. Indexes that contain fields that are converted to text type are ignored.
4. In order to preserve unique index names within the SQL Server database, the index name has a unique sequence number appended to it.

All other index elements are converted as-is.

Other schema items

Mandatory fields are written into SQL Server as NOT NULL

Default values are written directly into the SQL database with the equivalent value, except for the PROGRESS unknown value, which is written as blank for character and date fields, and zero for numbers.

Arrays

The Pro2MS routines expand array variables into individual fields. Each field is named as follows:

Array[1], array[2],array[3],.....array[n]

Becomes

Array__1,array__2,array__3,.....array__n

It should however be noted that in most languages that are used to develop programs against SQL databases such as PERL or PHP, arrays and loops normally start at value 0. To achieve this, modify the code, where marked, in ptmsch.p

Field and File Name conversion

The Pro2MS routines make various changes to the field and file names to ensure they are compliant with MS SQL naming conventions. These changes are made in the include file d2us.i. The following rules are applied:

1. All field/file/database names are converted to upper case. Depending on your requirements, change the code in d2us.i to convert them to lower case, but in any case, be consistent.

2. All occurrences of the "-"(minus) character are converted to an "_"(underscore).
3. The resulting variable name is compared against a list of MS SQL reserved words. If the variable is a reserved word, it is prefixed with "X_", which will at least allow the schema to load into MS SQL. The MS SQL reserved words are held in the include file mssqlr.i which can be modified as necessary.

To see all these features in action, run the ptmsch.p program against the SPORTS database, and view the output. Note that the Order table has been renamed X_ORDER.

Transferring the data

Chapter

3

Dumping the data

The ptmd.p routines provide a way to dump data out of the PROGRESS database in a format that is acceptable to the fast load format of MSSQL. The fast load format provides a rapid method of populating a MSSQL database, for example, a mid-range Linux system can load the SPORTS database in under a minute.

Limitations of the data dump.

The data dump currently cannot process raw data fields. Data in fields defined as raw format is replaced by a null value.

Transferring user security

Chapter

4

The *ptmsec.p* extracts the security data from the schema, and converts it to MSSQL GRANT / REVOKE statements. The format that uses is as follows:

1. For each user in the PROGRESS _user file, a GRANT usage record on the database is created. This usage is only granted @localhost. In order to change this, modify the functions *AddPriv* and *RevokePriv* in ptmsec.p.
2. Privileges on all tables in the schema are revoked using REVOKE ALL PRIVILEGES.
3. For each table in the database, the following actions are taken:
 - a. The _can-* records are parsed, and a list of inclusions and exclusions are built.
 - b. For each user that does have access to a particular function, a grant record is added to the security File.
 - c. For _can-create, an INSERT record is created
 - d. For _can-read a SELECT record is created.
 - e. For _can-write, an UPDATE record is created.
 - f. For _can-delete a DELETE record is created.
 - g. Currently _can-dump and _can-load privileges are ignored. There are no direct equivalents in MSSQL, although there is some correlation with the FILE privilege. To associate one of these PROGRESS privileges with FILE, modify the ptmsec.p routine.
4. Column security is currently ignored.

The output appears in the file DBNAME_SECURITY.SQL

Using the Routines

Chapter

5

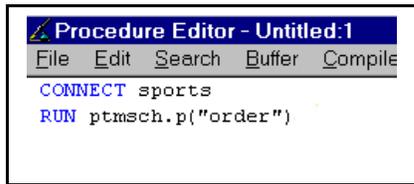
There are 4 routines to call from the command line.

Ptmsch.p

To dump the schema, run ptmsch.p from the progress command line, passing an input parameter of either

- "ALL" to dump the schema for all tables.
- "TABLENAME" to dump the schema for an individual table.

e.g. to dump the "order" schema from the SPORTS database, from the command line, run:



```
Procedure Editor - Untitled:1
File Edit Search Buffer Compile
CONNECT sports
RUN ptmsch.p("order")
```

A file will be created in the current directory named SCH_ORDER.SQL. The file looks like this:

```
DROP TABLE X_ORDER;
CREATE TABLE X_ORDER(
    PROGRESS_RECID bigint NOT NULL,
    BILLTOID integer DEFAULT 0,
    CARRIER varchar(25) DEFAULT '',
    CREDITCARD varchar(20) DEFAULT 'Visa',
    CUSTNUM integer DEFAULT 0,
    INSTRUCTIONS varchar(50) DEFAULT '',
    ORDERDATE date,
    ORDERNUM integer DEFAULT 0,
    ORDERSTATUS varchar(20) DEFAULT 'Ordered',
    PO varchar(20) DEFAULT '',
    PROMISEDATE date,
    SALESREP varchar(4) DEFAULT '',
    SHIPDATE date,
    SHIPTOID integer DEFAULT 0,
    TERMS varchar(20) DEFAULT 'Net30',
    WAREHOUSENUM integer DEFAULT 0,
CONSTRAINT PK_X_ORDER PRIMARY KEY CLUSTERED (progress_recid ASC) ON [PRIMARY]
);
CREATE INDEX CUSTORDER_1 ON X_ORDER(
    CUSTNUM,
    ORDERNUM);
CREATE INDEX ORDERDATE_2 ON X_ORDER(
    ORDERDATE);
CREATE INDEX ORDERNUM_3 ON X_ORDER(
    ORDERNUM);
CREATE INDEX ORDERSTATUS_4 ON X_ORDER(
    ORDERSTATUS);
CREATE INDEX SALESREP_5 ON X_ORDER(
    SALESREP);
```

In addition, a file called errors.txt is created in the directory. This contains further information about any changes that will be made to the schema.

When dumping the complete schema, the file would be MSSQL_"dbname".SQL. The file begins with the following example lines:

```
USE SPORTS;
```

Take care when merging the schema with an existing database, as this syntax will cause MSSQL to drop the existing database without checking to see if it contains any data.

To load the schema into the MSSQL database use the Management Console, Load the File and run.

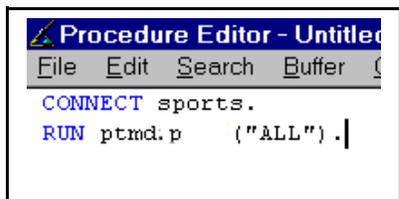
This should only take a few seconds to load the schema.

Ptmd.p

To dump the data from a PROGRESS database, run *ptmd.p*, passing an input parameter of either:

- "ALL" to dump the data for all tables.
- "TABLENAME" to dump the data for an individual table.

e.g. to dump the data from all tables in the SPORTS database, from the command line, run:



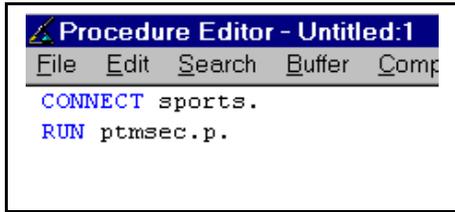
```
Procedure Editor - Untitled
File Edit Search Buffer
CONNECT sports.
RUN ptmd.p ("ALL").|
```

For each table dumped, the data will appear in a file named <TABLENAME>.TXT. In addition, a SQL file, called ***MSSQL_DATA*** will be created, with the necessary BULK INSERT statements for each table. To modify the command, modify the *ptmd.p* file

```
TRUNCATE TABLE X_ORDER;
BULK INSERT X_ORDER FROM 'C:\\PRO2MS\\order.TXT'
WITH (FIELDTERMINATOR = '***!##!***',
ROWTERMINATOR = '\\n',
FIRSTROW=1,
MAXERRORS=10
);
```

Ptmsec.p

To dump security definitions from the database, run ptmsec.p from the command line.



```
Procedure Editor - Untitled:1
File Edit Search Buffer Comp
CONNECT sports.
RUN ptmsec.p.
```

The output will appear similar to the sample below.

```
## Security definitions dump for database SPORTS
GRANT USAGE ON SPORTS.* TO admin@localhost;
GRANT USAGE ON SPORTS.* TO test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.CUSTOMER FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.INVOICE FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.ITEM FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.LOCAL_DEFAULT FROM admin@localhost;
## Warning ORDER is a MSSQL reserved word.Its value was changed to X_ORDER
REVOKE ALL PRIVILEGES ON SPORTS.X_ORDER FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.ORDER_LINE FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.REF_CALL FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.SALESREP FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.STATE FROM admin@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.CUSTOMER FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.INVOICE FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.ITEM FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.LOCAL_DEFAULT FROM test1@localhost;
## Warning ORDER is a MSSQL reserved word.Its value was changed to X_ORDER
REVOKE ALL PRIVILEGES ON SPORTS.X_ORDER FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.ORDER_LINE FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.REF_CALL FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.SALESREP FROM test1@localhost;
REVOKE ALL PRIVILEGES ON SPORTS.STATE FROM test1@localhost;
GRANT SELECT ON SPORTS.CUSTOMER TO admin@localhost;
GRANT SELECT ON SPORTS.CUSTOMER TO test1@localhost;
GRANT INSERT ON SPORTS.CUSTOMER TO admin@localhost;
GRANT INSERT ON SPORTS.CUSTOMER TO test1@localhost;
```


Database Conversion Strategy

Chapter

6

1. If converting to an Enterprise database, I recommend all pre-conversion tasks are done using SQL Server Express, downloadable from Microsoft.
2. Dump a complete schema using the ptmsch.p routine, and try a test Schema load. If any errors are reported, please email info@newnhams.com for support.
3. If the schema loads correctly, copy off the schema file. The major problem with the data load is likely to be character field truncation, due to the schema being created from the display format of the PROGRESS field, not the actual size of data stored in the field. The easiest way to deal with this problem is to modify the schema SQL file to make the schema match the data.
4. Set the maxRecords value in ptmd.p to 10 and run ptmd.p ('ALL'). This will dump 10 records for each table.
5. Use the DATA dump SQL to load the data into the database. This will identify any serious data load issues. If the load reports and data truncation issues, then modify the Schema SQL file and reload the schema. Rerun the data load as many times as necessary to complete a clean load.
6. Set the maxRecords value to 1000 and dump the database again. At this point, the volume of data transferred should be adequate for any proof-of-concept requirements.
7. Once a clean load has been obtained, a complete transfer can be attempted. On a reasonably fast machine, data dump can be estimated at 500mb/hour. Load Time is around half that.
8. If converting onto an enterprise system, the shema and data files can then be loaded to the main server.

The GPL license

Appendix

A

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Version 2, June 1991

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Change Log

Appendix

B

Version 1.2

Description	Thanks to
Converted field names containing the special character # to HASH, and issued warning	
Ignored and warned about indices that would contain TEXT type fields.	

Version 3.0

Description	Thanks to
Fixed index issues with array fields	
Fixed index issues with text fields	
Improvements to large table handling	Scott Auge