The LIBNAME Engine Compared to SQL Pass-Through

Steven Feder, Federal Reserve Board of Governors, Washington, DC

ABSTRACT

Both the LIBNAME engine and SQL pass-through provide access to databases. SQL pass-through passes code directly to the database. Without pass-through, SAS generates an optimized database query. LIBNAME coding is simple and familiar, and the efficiency is optimized by SAS®. Is there any reason for most users ever to use SQL pass-through? This paper will compare code and results for DB2® using SAS ON OS/390, and ODBC drivers to the same DB2 server on Windows SAS.

WINDOWS

The pass-through code uses a CONNECT statement to specify the database instead of the LIBNAME statement. Both specify the ODBC driver which points to the DB2 server.

PASS-THROUGH

```sas
proc sql;
    connect to odbc(dsn=M1DB2P user=xxxxx password=xxxxx);
    create table out.fcexrcri3 as
        select * from connection to odbc
            (select fcex.*,rcri.dt
             from fdrp.cuv_fcex01 as fcex
             inner join fdrp.cuv_rcri01 as rcri
             on fcex.id_rssd=rcri.id_rssd
             where rcri.dt=19591231);
    disconnect from odbc;
quit;
```

LIBNAME

```sas
libname in odbc complete="dsn=M1DB2P;Uid=xxxxx;pwd=xxxxx"
    schema=fdrp;

proc sql;
    create table out.fcexrcri1 as
        select fcex.*,rcri.dt
        from in.cuv_fcex01 as fcex
        inner join in.cuv_rcri01 as rcri
        on fcex.id_rssd=rcri.id_rssd
        where rcri.dt=19591231;
quit;
```

DATA STEP

```sas
data out.fcexrcri2;
    merge in.cuv_fcex01(in=infcex in=infcex)
        in.cuv_rcri01(in=inrcri keep=id_rssd dt in=inrcri
            where=(dt=19591231));
    by id_rssd;
    if infcex and inrcri;
```
COMPARISON

The pass-through and LIBNAME code produce very similar mean run-times. The DATA STEP code uses significantly more user cpu, though slightly less system cpu. (See Table 1).

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>real time</td>
<td>01:10.7</td>
<td>01:00.0</td>
<td>02:24.2</td>
</tr>
<tr>
<td>user cpu time</td>
<td>3.79</td>
<td>3.81</td>
<td>3.92</td>
</tr>
<tr>
<td>system cpu time</td>
<td>0.82</td>
<td>0.76</td>
<td>0.54</td>
</tr>
</tbody>
</table>

|               |         |         |         |         |
|---------------|---------|---------|---------|
| SQL           |         |         |         |         |
| real time     | 01:26.1 | 01:13.7 | 01:41.9 | 01:27.2 |
| user cpu time | 3.95    | 3.95    | 3.59    | 3.83    |
| system cpu time | 0.51 | 0.68    | 0.7     | 0.63    |

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA STEP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>real time</td>
<td>02:58.4</td>
<td>01:13.1</td>
<td>02:05.0</td>
</tr>
<tr>
<td>user cpu time</td>
<td>4.85</td>
<td>5.03</td>
<td>4.76</td>
</tr>
<tr>
<td>system cpu time</td>
<td>0.59</td>
<td>0.53</td>
<td>0.42</td>
</tr>
</tbody>
</table>

The data step code, while less efficient, may be preferable when extensively manipulating the data.

OS/390

The coding is very similar, though there are some small differences in the CONNECT and LIBNAME. Only the differing statements are listed here:

PASS-THROUGH

    CONNECT TO DB2(SSID=DSN);

LIBNAME

    LIBNAME IN DB2 SSID=DSN AUTHID=FDRP;

COMPARISON

The results are similar to those for WINDOWS. PASS-THROUGH and LIBNAME are about the same. DATA STEP is worse, but not so bad as to be prohibitive. (See table 2.)
**IMBEDDED SELECT**

Queries are commonly imbedded within other queries. The code as written by the user is again similar for both pass-through and LIBNAME:

```
proc sql;
  connect to odbc(dsn=M1DB2P user=m1shf00 password=lo181972);
  create table out.fcexrcrri2 as
    select * from connection to odbc
      {select fcex.*
       from fdrp.cuv_fcex01 as fcex
       where id_rssd in(
         select id_rssd
         from fdrp.cuv_rcri01
         where dt=19591231));
  disconnect from odbc;
quit;

proc sql;
  create table out.fcexrcrri1 as
    select fcex.*
    from in.cuv_fcex01 as fcex
    where id_rssd in(
      select id_rssd
      from in.cuv_rcri01
      where dt=19591231);
quit;
```

The results are similar as well. (See Table 3.) This suggests that for many uses pass-through and LIBNAME code will run with similar efficiency.

**TABLE 3**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASS-THROUGH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>real time</td>
<td>01:08.6</td>
<td>02:11.3</td>
<td>01:03.3</td>
<td>01:27.7</td>
</tr>
<tr>
<td>user cpu time</td>
<td>3.78</td>
<td>3.4</td>
<td>3.68</td>
<td>3.62</td>
</tr>
<tr>
<td>system cpu time</td>
<td>0.62</td>
<td>0.71</td>
<td>0.57</td>
<td>0.63</td>
</tr>
</tbody>
</table>
### FUNCTIONS

Using the LIBNAME, SAS still passes certain functions to DB2 for processing. (See *SAS/ACCESS 9.1 Supplement for DB2 under z/OS*, p. 34 for a list of these.) So one would expect these functions to perform the same whether passed explicitly with PASS-THROUGH or implicitly with LIBNAME. For using these functions, all else being equal, LIBNAME will be preferable because the coding is slightly simpler. DB2 does offer, however, a range of other functions which are not available in SAS. (See chapter 3 of the *DB2 UDB SQL Reference for Cross-Platform Development Version 2* for a list of these.) For these, PASS-THROUGH must be used. For example, the VARCHAR function returns a character from a numeric variable:

```sql
select varchar(rcri.rcfd3230) as rcfd3230_v.
```

### REFERENCES


[Online link to the article](http://www2.sas.com/proceedings/sugi29/107-29.pdf)


### ACKNOWLEDGMENTS

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute, Inc. in the USA and other countries.

DB2 is a Registered Trademark of International Business Machines Corporation.

### CONTACT INFORMATION

Steven Feder  
Federal Reserve Board, Mail Stop 157  
Washington, D.C. 20551  
202-452-3144  
email: steven.h.feder@frb.gov