SAS® GLOBAL FORUM 2016

IMAGINE. CREATE. INNOVATE.

From SAS® Data Management to Big Data Appliances

How SAS/ACCESS® Makes Life Easier

#SASGF

From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

Context

90% **of all the data** **in the** **has been generated** **over the last** **2 years**

New technologies are developed to help companies handle this huge volume of data. Amongst them, the Massively Parallel Processing (MPP), enabling splitting data and queries across a large number of nodes in order to perform simultaneous computation.

What is the issue?

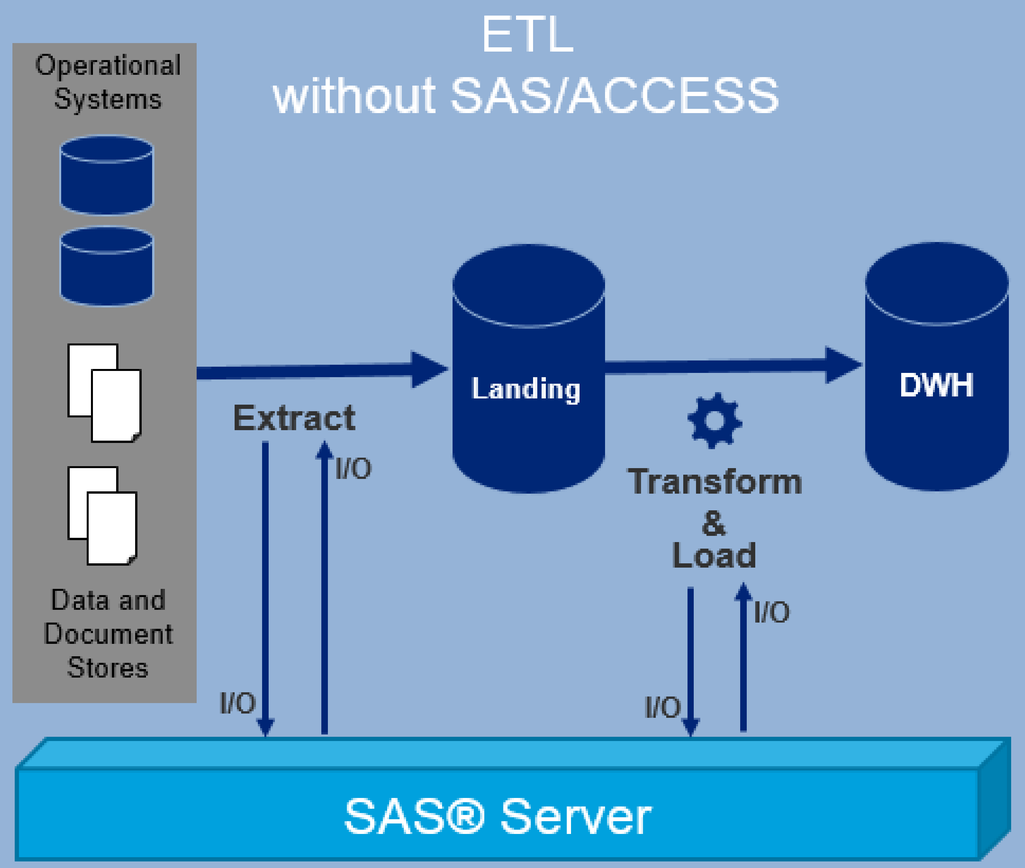
Many (large) companies are struggling in dealing with these technologies and more importantly on integrating them in their existing data management processes.

Moreover, they also want to rely on the knowledge built by their teams in existing products and implementing change to learn new technologies can therefore be a costly procedure.

How SAS is helping?

SAS® is perfectly fitting in this situation by offering a suite of software that can be set up to work with any third-party database through the usage of the corresponding SAS/ACCESS®. Indeed, for every new database technology SAS® is releasing a specific SAS/ACCESS® allowing users to develop and migrate SAS® solutions almost transparently. Only few techniques have to be known by your users to combine the power of SAS® with a third-party (big) database.

In-Database Processing



From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

Context

90% **of all the data** **in the** **has been generated** **over the last** **2 years**

New technologies are developed to help companies handle this huge volume of data. Amongst them, the Massively Parallel Processing (MPP), enabling splitting data and queries across a large number of nodes in order to perform simultaneous computation.

What is the issue?

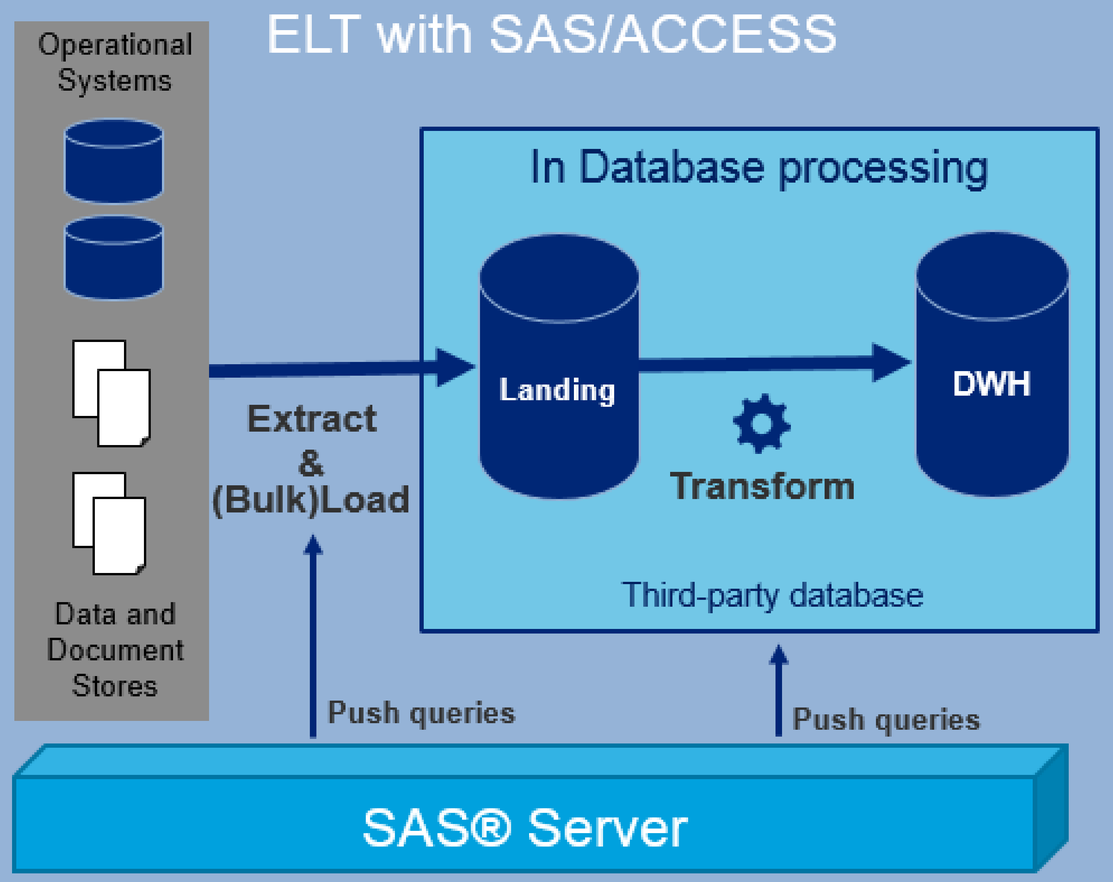
Many (large) companies are struggling in dealing with these technologies and more importantly on integrating them in their existing data management processes.

Moreover, they also want to rely on the knowledge built by their teams in existing products and implementing change to learn new technologies can therefore be a costly procedure.

How SAS is helping?

SAS® is perfectly fitting in this situation by offering a suite of software that can be set up to work with any third-party database through the usage of the corresponding SAS/ACCESS®. Indeed, for every new database technology SAS® is releasing a specific SAS/ACCESS® allowing users to develop and migrate SAS® solutions almost transparently. Only few techniques have to be known by your users to combine the power of SAS® with a third-party (big) database.

In-Database Processing



From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

How to push code for in-database processing?

Explicit pass-through

- Use the **PROC SQL CONNECT – EXECUTE** statements.
- The SQL query has to be able to work AS-IS in the database.
- Database will generates errors if a query contains anything SAS specifics:
  - SAS formats.
  - SAS functions.
  - DATE or DATETIME actual numeric values.
  - INTO: macro variable.
  - SAS options.
  - Using multiple librefs.

```
PROC SQL;

   CONNECT to NETEZZA (
       DATABASE=SANDBOX
       SERVER=&NZ_SERVER
       USER=&NZ_USER
       PASSWORD=&NZ_PSW);

   EXECUTE (
      CALL DROP_OBJECT_IF_EXISTS('D_DATE', 'TABLE');
   ) BY NETEZZA;

   DISCONNECT FROM NETEZZA;

QUIT;
```

From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

How to push code for in-database processing?

Implicit pass-through

- Use the **LIBNAME** engine.
- Use the various DBMS data types and translate them into SAS formats.
- SAS attempts to generate a database specific SQL query that will be executed in-database.
- Not all SAS functions and procedures can be converted to DBMS-specific syntax. As example, Netezza engine supports:
  - 48 SAS functions
  - 7 SAS procedures

```
LIBNAME nz NETEZZA DATABASE='SANDBOX'
                   SERVER='XX.XX.XX.XXX'
                   SCHEMA='admin'
                   USER=admin
                   PASSWORD="XXXXX";
```

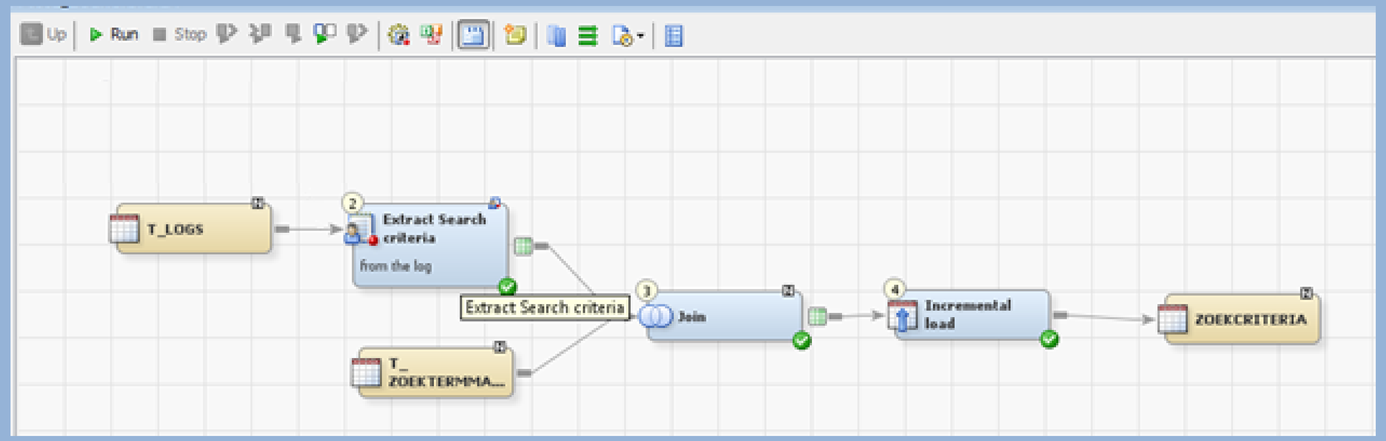
From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

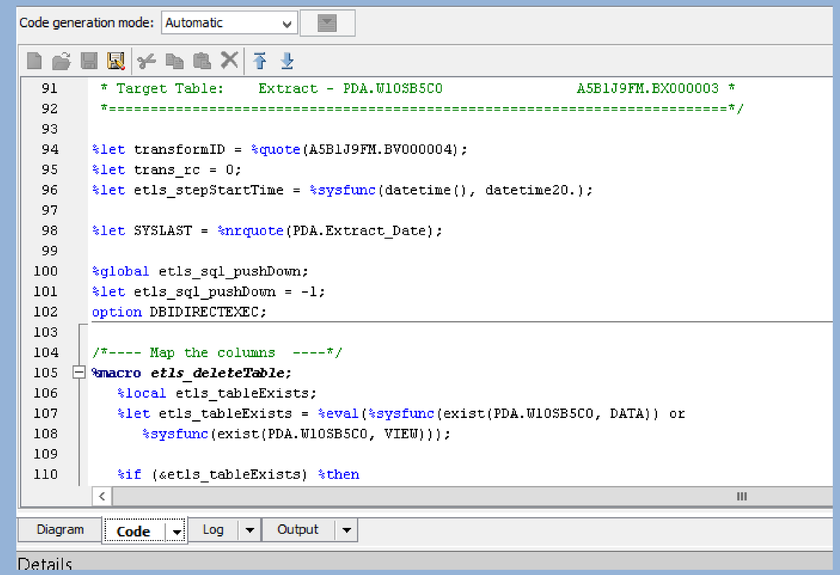
Magali Thésias
Senior Specialist - Deloitte

SAS® DATA INTEGRATION STUDIO

- Data Transforms
- Apply Business Rules
- Analytic Transforms

Implicit pass-through code generation



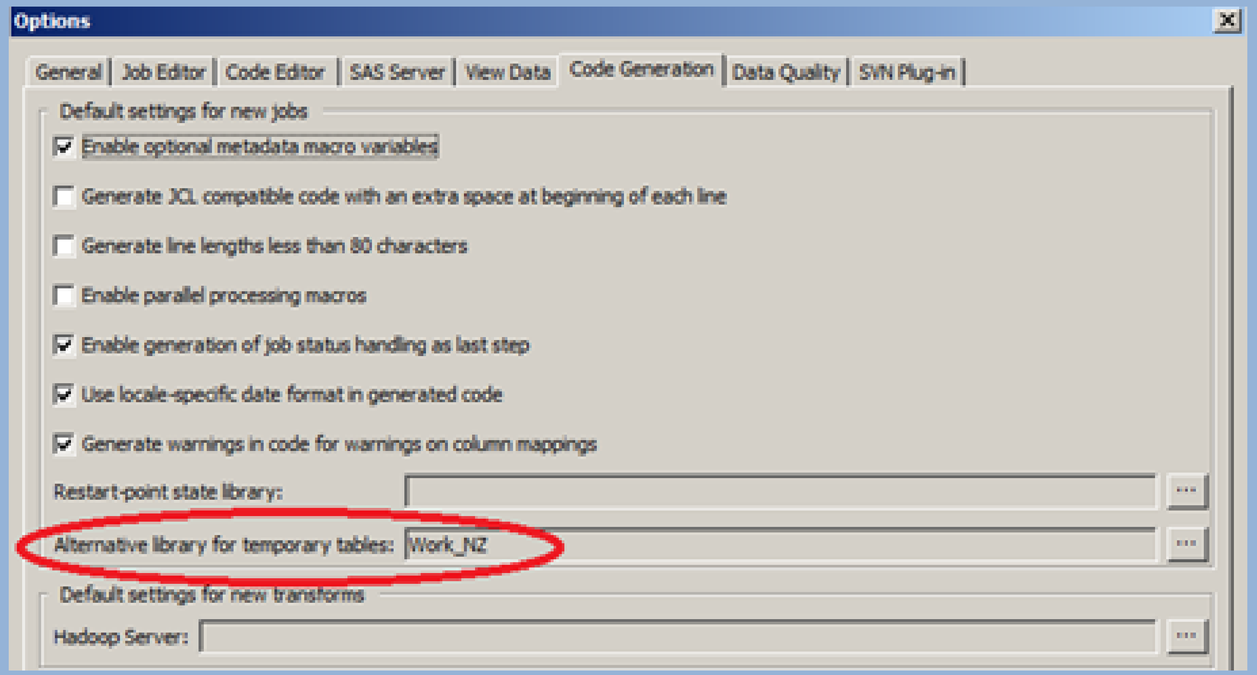


From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

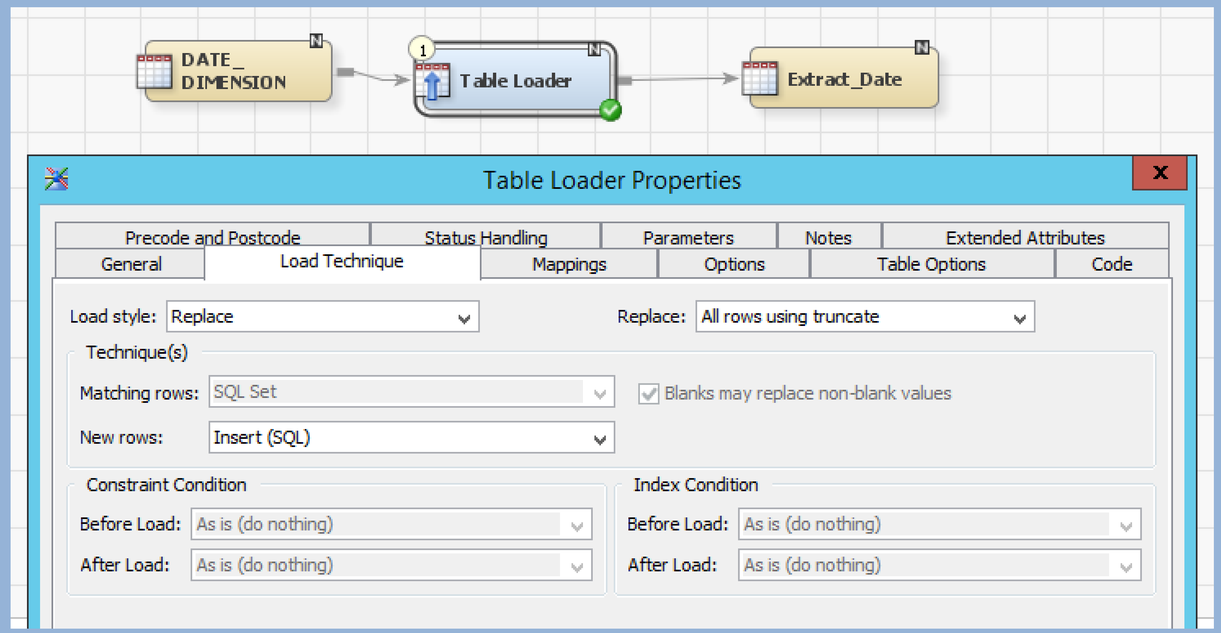
Magali Thésias
Senior Specialist - Deloitte

Best practices to create ELT data flows with SAS® DI Studio

Redirection of the default SAS work



Leverage bulk load capability

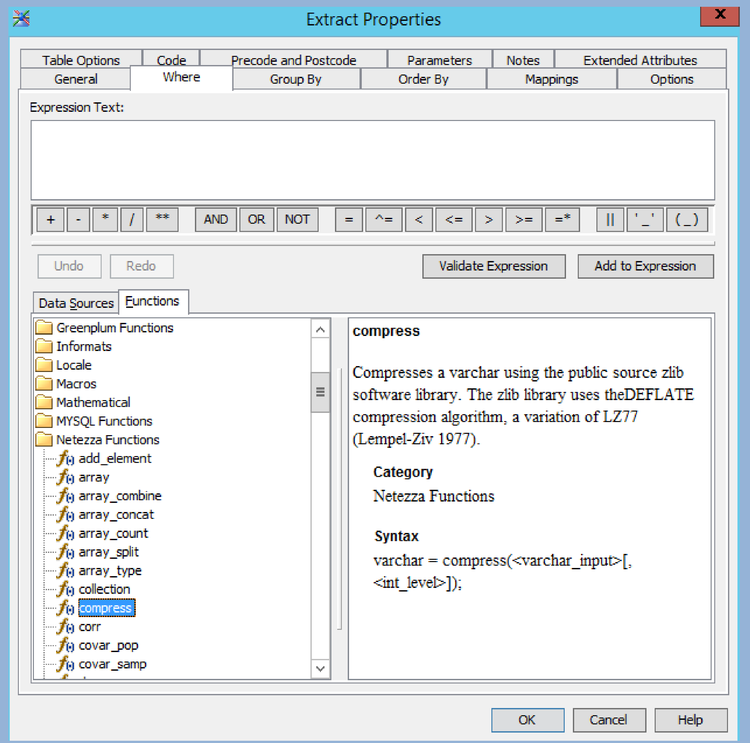


From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

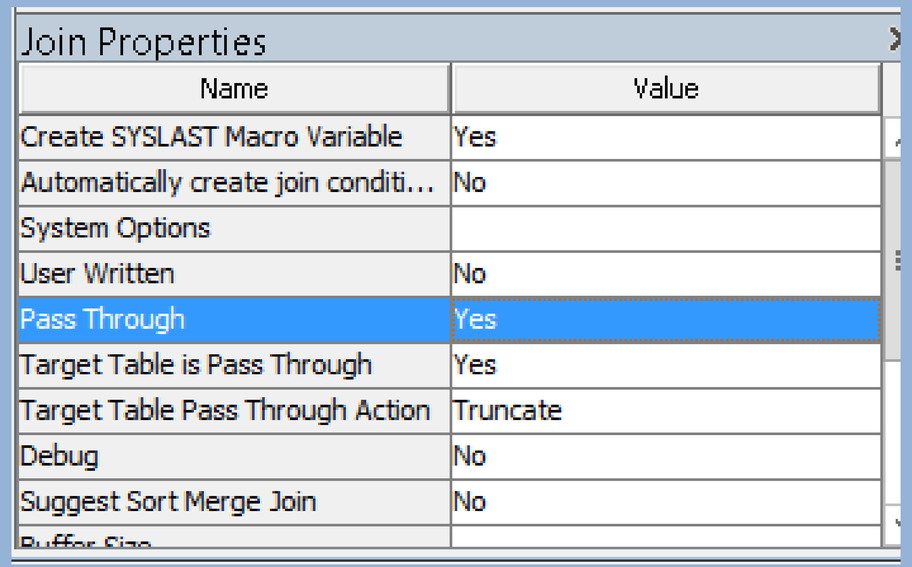
Magali Thésias
Senior Specialist - Deloitte

Best practices to create ELT data flows with SAS® DI Studio

Use database specific SQL functions to generate explicit SQL pass-through



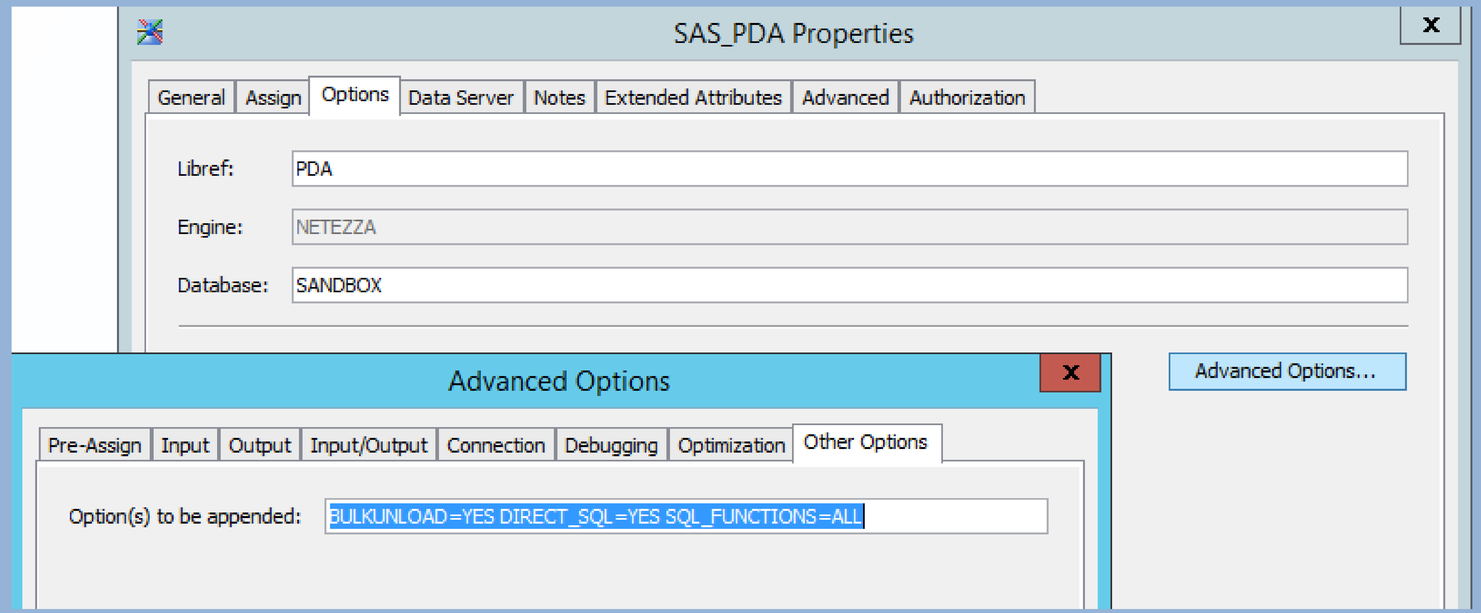
Create explicit pass-through SQL join



From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

Libname options



BULKUNLOAD=YES

DIRECT_SQL=

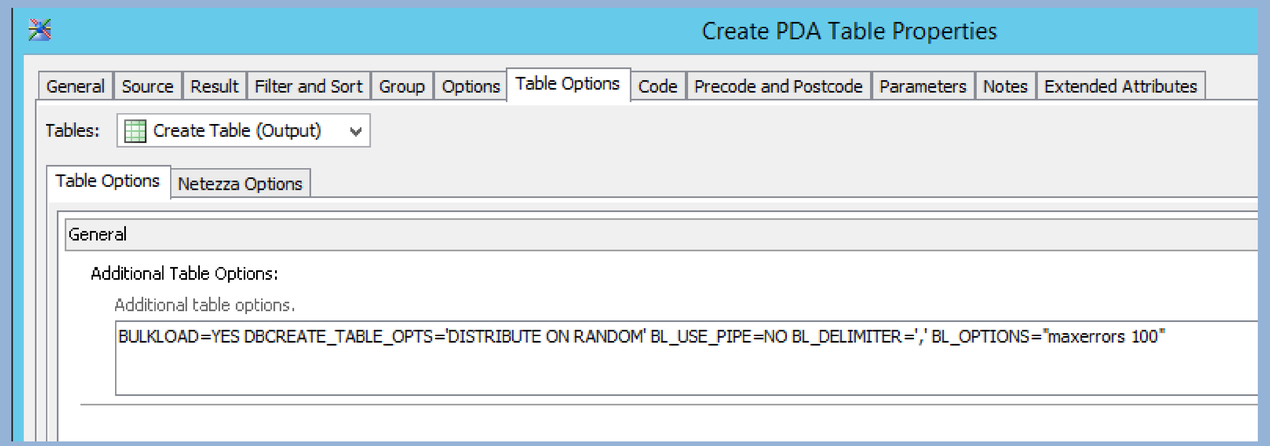
SQL_FUNCTION=ALL

From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

Table Creation and Loading Options

BULKLOAD=YES



BL_OPTIONS=

DBCREATE_TABLE_OPTS=

BL_USE_PIPE=NO

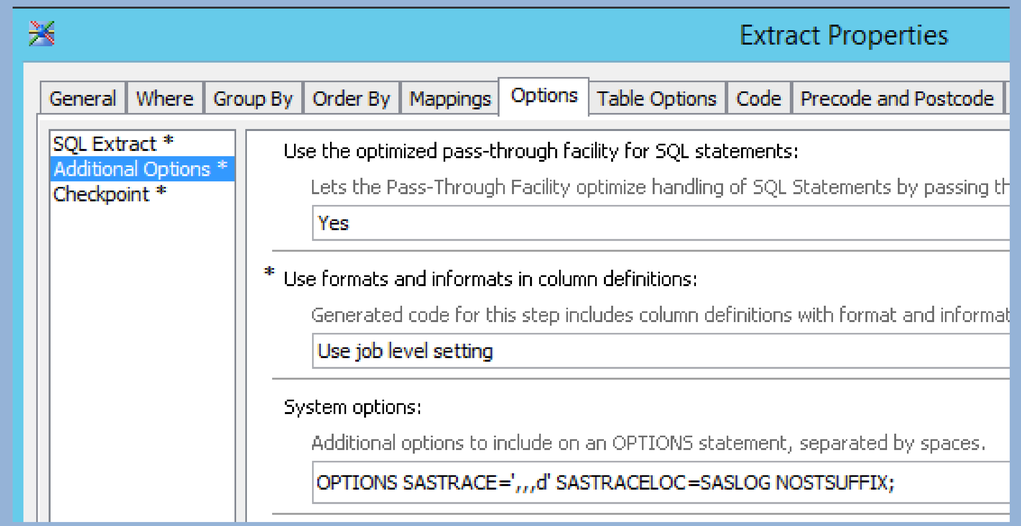
BL_DELIMITER=

From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

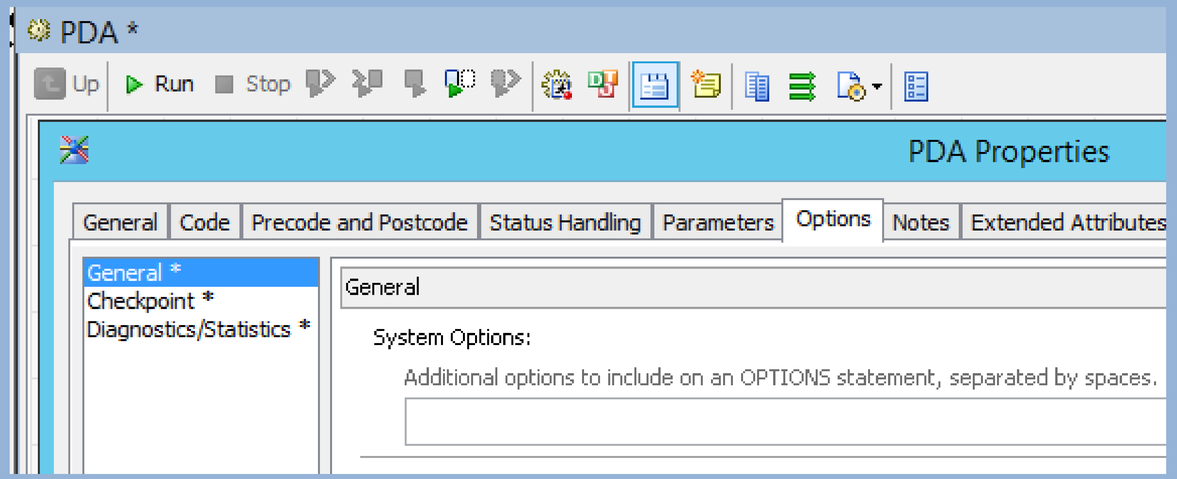
Magali Thésias
Senior Specialist - Deloitte

See what is happening in database: System Option

In a transformation



At job level



SASTRACE

From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

See what is happening in database: SASTRACE

Create PDA Table Properties

General | Source | Result | Filter and Sort | Group | Options | Table Options | Code | Precode and Postcode | Parameters | Notes | Extended Attributes

Code generation mode: Automatic

```
45
46  proc sql
47     _method
48  ;
49  create table PDA.NZ_TABLE
50  (
51     BULKLOAD=YES DBCREATE_TABLE_OPTS='DISTRIBUTE ON RANDOM' BL_USE_PIPE=NO BL_DELIMITER=',' BL_OPTIONS="maxerrors 100"
52  ) as
53  select *
54  from
55     SASDATA.WAC6IORA as WAC6IORA
56  ;
57  quit;
```

PDA *

Up | Run | Stop

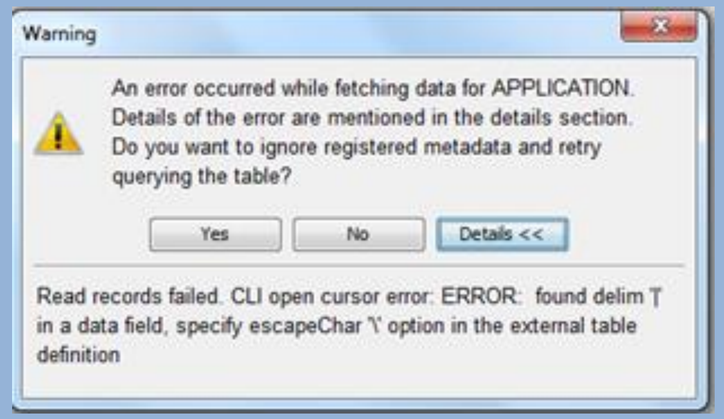
```
106 NETEZZA: AUTOCOMMIT turned OFF for connection id 2
107 NOTE: SAS variable labels, formats, and lengths are not written to DBMS tables.
108
109 NETEZZA_5: Executed: on connection 2
110 CREATE TABLE SANDBOX.ADMIN.NZ_TABLE (DDAT_SKEY BIGINT,DDAT_BKEY DATE,DDAT_DATE VARCHAR(10),DDAT_DATE_SHORT
    ...
130 VARCHAR(44),DDAT_SEMESTER_OFFSET BIGINT) DISTRIBUTE ON RANDOM
131
132 NETEZZA: COMMIT performed on connection 2.
133
134 NETEZZA_6: Executed: on connection 2
135 INSERT INTO SANDBOX.ADMIN.NZ_TABLE SELECT * FROM  EXTERNAL 'BL_NZ_TABLE_5BEC915E-5E13-41BD-A1C5-29D30A264F38.dat' USING ( DELIMITER
136 ',' REMOTESOURCE 'ODBC'  NULLVALUE '' maxerrors 100)
137
```

Diagram | Code | Log | Output

From SAS® Data Management to Big Data Appliances: How SAS/ACCESS® Makes Life Easier

Magali Thésias
Senior Specialist - Deloitte

How to use these options? A concrete example



Log result thanks to SASTRACE system option

```
Netezza_20: Executed on connection 4
CREATE EXTERNAL TABLE '/tmp/tablename' using(DELIMITER '|' REMOTESOURCE
'ODBC' NULLVALUE '') AS SELECT
…
ERROR: CLI open cursor error: ERROR: found delim '|' in a data field,
specify escapeChar '\' option in the external table definition.
```

- In-database processing cannot be executed, so an external table is created to download data on the SAS® server.
- The default delimiter (pipe) is used but this character is found in one of table columns.

→ Unload properly the data by using the bl_delimiter option.

Magali Thésias
Senior Specialist - Deloitte

Conclusions

- SAS/ACCESS® is automatically generating SQL code compliant with your third-party database.
  - SAS® users can rely on their knowledge.
  - SAS® development is back-end independent.
- The only extra knowledge needed is a set of options to fine tune the in-database processing.
- Nevertheless, explicit pass-through SQL code can be sent to the third-party database.

SAS® GLOBAL FORUM 2016

IMAGINE. CREATE. INNOVATE.

LAS VEGAS | APRIL 18-21

#SASGF