ABS Tech Note: DAL04 Character Translation Tables (2/93)

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TOPIC --

This document provides a technical description and overview of the
character translation mechanism used (in the IBM environment) by Apple's
Data Access Language Clients and Servers.

DISCUSSION ---

Purpose

Character translation is necessary whenever devices utilizing ASCII
character representation will be communicating with devices that use EBCDIC
character representation. Generally speaking, only the larger IBM hosts
have operating systems that utilize EBCDIC, or where the character sets are
interpreted differently between host and client. All others, including
DOS-based PCs, represent characters in ASCII. The reasons why these code
sets have developed in parallel will not be addressed within the scope of
this document. It can simply be stated that some form of translation must
occur if one device is to "understand" the other. Additionally, there are
no requirements for where (that is, a physical location) this translation
should take place.

DAL Internal Data Format and Host Translation

DAL uses an internal data format for communication between servers and
clients. Use of this internal format allows DAL Clients to communicate
with a variety of servers. The format is based upon IBM Code Page 850, an
ASCII representation that is commonly used for PC to mainframe
communications. (A 'Code Page' is the IBM term for a table that is used by
applications and/or system software for some form of character
translation.) Data to and from the Server is in ASCII and therefore
requires translation to EBCDIC prior to being forwarded to the database
subsystem (for example, DB2). There are two internal tables to perform
this task: one from ASCII to EBCDIC (inbound to the host) and one from
EBCDIC to ASCII (outbound from the host). The two tables are mirror images
of each other to ensure that data that is sent to the host and stored will
be the same when it is retrieved at a later time by the client.

User Translate Tables

Two User Translate Tables are provided should any custom translation be
desired. They have the same name in all DAL Servers for the IBM
environment. For ASCII to EBCDIC, the table is named "UASC2EBC"; for
EBCDIC to ASCII it is named "UEBC2ASC". Each table consists of 256 (from
X'0' to X'255') storage constants in IBM 370 Assembler format. The Server
utilizes these two user tables for translation in place of the default
internal tables if they are present at linkedit time. Read "National
Language Support" later in this document for more information on using
these tables.

Macintosh Character Set

The character set on the Macintosh is ASCII-based. Apple uses the same
internal representation for all Roman languages (as opposed to the Host
Code Pages on IBM EBCDIC-based machines). Like the server, the client
translates the Macintosh ASCII into DAL internal format prior to
transmission towards the server. These client-based translation tables do
not require any modifications when communicating to the IBM environment.

National Language Support

Starting with Version 1.3.8 of the DAL IBM Servers, Apple provides a macro
that supports National Language characters. This macro is named 'DALLOCAL'
and is stored as member 'DALLOCAL' in the RUN.JCL supplied with the product
tape for the VTAM and TSO Servers. For the VM Server, this macro is stored
in a file named 'DALLOCAL' with a filetype of 'ASSEMBLE'. This macro must
be assembled and linked with the server load module; the output from the
linkedit will be the new load module for the server. Sample JCL is
included with the VTAM and TSO versions. For VM, use the standard
assembler and add an 'INCLUDE DALLOCAL' statement in the linkedit control
file (this control file is named 'LNKDAL' with a filetype of 'EXEC'). To
support one of the languages included with 'DALLOCAL', remove the comment
character and perform the assembly. Copies of the default (internal)
tables are also included for reference or other desired customizations.
If you wish to create your own tables, you will need a copy of Code Page
850 as well as the Host Code Page for your environment. Contact your
authorized IBM representative for more information on Code Pages.
Languages not present in the 'DALLOCAL' macro may be supported in a future
release.

Please note that the entry point and included 'SYSLIB' module specified on
the linkedit control cards are different for TSO and VTAM:

• For TSO, specify 'ENTRY   CL1HEAD' and 'INCLUDE SYSLIB(DALSVR)'

• For VTAM, specify 'ENTRY   STARTUP' and 'INCLUDE SYSLIB(DALSERVE)'

If you have changed the load module name of the server to something other
than the default as shipped, you will need to reflect this change in the
'INCLUDE' card(s).

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Internal Conversion of Characters by DB2 and SQL/DS
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Some characters received by DB2 and SQL/DS will be converted to spaces
(EBCDIC X'40') when stored on the host.  These will be subsequently
translated and received as spaces by the client.  This is because the
database subsystems will not store 'unprintable' characters such as those
between X'00' and X'3F' in EBCDIC.  If you encounter this situation, verify
that you are sending the proper characters from the client.


National Language Support Considerations
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Support of National Languages can be handled in the IBM environment on
several levels.  It is installation dependent as to whether any or all of
the following modifications have been performed to support a National
Language.  Check first with the systems programmer responsible for the
installation and maintenance of the host operating system before enabling
National Language support within the DAL Servers; results may be
unpredictable if there are any discrepancies.


Specific things to note:


• If a 3X74 Cluster Controller (for 3270-style terminals) is being used, a
  language support feature may have been generated within the cluster.


• Code Pages for the host operating system (for example, as MVS) may be
  installed.


• Localized versions of the host software (for example, TSO or CMS) may be
  installed.


For example, a Macintosh may have a French version of the system software
installed; the DAL MVS/VTAM Server may have been relinked to support the
French Code Page.  However, if the Code Page on the host is not French,
there will be some characters that do not display properly if viewed using
a host-based utility (such as SPUFI under DB2).  Characters sent from the
Macintosh, stored on the host, and later retrieved for display on the
Macintosh, will still display correctly due to the "mirror-image" feature
of DAL's translation tables.
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