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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).

Internal Conversion of Characters by DB2 and SQL/DS

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

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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