               HZ - A Data Format for Exchanging Files of
                Arbitrarily Mixed Chinese and ASCII characters

Status of this Memo

   This memo provides information for the Internet community. This memo
   does not specify an Internet standard of any kind. Distribution of
   this memo is unlimited.

Abstract

   The content of this memo is identical to an article of the same title
   written by the author on September 4, 1989. In this memo, GB stands
   for GB2312-80. Note that the title is kept only for historical
   reasons. HZ has been widely used for purposes other than "file
   exchange".

1. Introduction

   Most existing computer systems which can handle a text file of
   arbitrarily mixed Chinese and ASCII characters use 8-bit codes. To
   exchange such text files through electronic mail on ASCII computer
   systems, it is necessary to encode them in a 7-bit format. A generic
   binary to ASCII encoder is not sufficient, because there is currently
   no universal standard for such 8-bit codes. For example, CCDOS and
   Macintosh's Chinese OS use different internal codes. Fortunately,
   there is a PRC national standard, GuoBiao (GB), for the encoding of
   Chinese characters, and Chinese characters encoded in the above
   systems can be easily converted to GB by a simple formula. (* The ROC
   standard BIG-5 is outside the scope of this article.)

   HZ is a 7-bit data format proposed for arbitrarily mixed GB and ASCII
   text file exchange. HZ is also intended for the design of terminal
   emulators that display and edit mixed Chinese and ASCII text files in
   real time.

2. Specification

The format of HZ is described in the following.

Without loss of generality, we assume that all Chinese characters
(HanZi) have already been encoded in GB. A GB (GB1 and GB2) code is
a two byte code, where the first byte is in the range $21-$77
(hexadecimal), and the second byte is in the range $21-$7E.

A graphical ASCII character is a byte in the range $21-$7E. A non-
graphical ASCII character is a byte in the range $0-$20 or of the
value $7F.

Since the range of a graphical ASCII character overlaps that of a GB
byte, a byte in the range $21-$7E is interpreted according to the
mode it is in. There are two modes, namely ASCII mode and GB mode.

By convention, a non-graphical ASCII character should only appear in
ASCII mode.

The default mode is ASCII mode.

In ASCII mode, a byte is interpreted as an ASCII character, unless a
'~' is encountered. The character '~' is an escape character. By
convention, it must be immediately followed ONLY by '~', '{' or '\n'
(<LF>), with the following special meaning.

o The escape sequence '~~' is interpreted as a '~'.
o The escape-to-GB sequence '~{' switches the mode from ASCII to
  GB.
o The escape sequence '~\n' is a line-continuation marker to be
  consumed with no output produced.

In GB mode, characters are interpreted two bytes at a time as (pure)
GB codes until the escape-from-GB code '~}' is read. This code
switches the mode from GB back to ASCII. (Note that the escape-
from-GB code '~}' ($7E7D) is outside the defined GB range.)

The decoding process is clear from the above description.

The encoding process is straightforward. Note that an (ASCII) '~' is
always encoded as '~~'. A sequence of GB codes is enclosed in '~{'
and '~}'.

3. Remarks & Recommendations

We choose to encode any ASCII character except '~' as it is, rather than as a two byte code, and we choose ASCII as the default mode for the following reasons. The computer systems we use is ASCII based. A HZ file containing pure ASCII characters (i.e. no Chinese characters) except '~' is precisely a pure ASCII file. In general, the English (ASCII) portion of a HZ file is directly readable.

The escape character '~' is chosen not only because it is commonly used in the ASCII world, but also because '~' ($7E) is outside the defined range ($21-$77) of the first byte of a GB code.

In ASCII mode, other potential escape sequences, i.e., two byte sequences beginning with '~' (other than '~~', '~{', '~\n') are currently invalid HZ sequences. Hence, they can be used for future extension of HZ with total upward compatibility.

The line-continuation marker '~\n' is useful if one wants to encode long lines in the original text into short lines in this data format without introducing extra newline characters in the decoding process.

There is no limit on the length of a line. In fact, the whole file could be one long line or even contain no newline characters. Any DECODER of this HZ data format should not and has no need to operate on the concept of a line.

It is easy to write encoders and decoders for HZ. An encoder or decoder needs to lookahead at most one character in the input data stream.

Given the current mode, it is also possible and easy to decode a HZ data stream by scanning backward. One of the implication is that "backspaces" can be handled correctly by a terminal emulator.

To facilitate the effective use of programs supporting line/page skips such as "more" on UNIX with a terminal emulator understanding the HZ format, it is RECOMMENDED that the ENCODER (which outputs in HZ) sets a maximum line size of less than 80 characters. Since '\n' is an ASCII character, the syntax of HZ then automatically implies that GB codes appearing at the end of a line must be terminated with the escape-from-GB code '~}', and the line-continuation marker '~\n' should be inserted appropriately. The price to paid is that the encoded file size is slightly larger.

It is important to understand the following distinction. Note that the above recommendation does NOT change the HZ format. It is simply an encoding "style" which follows the syntax of HZ. Note that this

"style" is not built into HZ. It is an additional convention built
"on top of" HZ. Other applications may require different "styles",
but the same basic HZ DECODER will always work. The essence of HZ is
to provide such a flexible basic data format for files of arbitrarily
mixed Chinese and ASCII characters.

4. Examples

To illustrate the "stylistic" issue of HZ encoding, we give the
following four examples of encoded text, which should produce the
same decoded output. (The recommendation in the last section refers
to Example 2.)

Example 1:   (Suppose there is no line size limit.)
This sentence is in ASCII.
The next sentence is in GB.~{<:Ky2;S{#,NpJ)l6HK!#~}Bye.

Example 2:   (Suppose the maximum line size is 42.)
This sentence is in ASCII.
The next sentence is in GB.~{<:Ky2;S{#,~}~
~{NpJ)l6HK!#~}Bye.

Example 3: (Suppose a new line is started whenever there is a mode
            switch.)
This sentence is in ASCII.
The next sentence is in GB.~
~{<:Ky2;S{#,NpJ)l6HK!#~}~
Bye.

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suggestions.

References

[1] Fung Fung Lee, "HZ - A Data Format for Exchanging Files of
    Arbitrarily Mixed Chinese and ASCII Characters," September 4,
    1989.
    As part of //ftp.ifcss.org/software/unix/convert/HZ-2.0.tar.gz

Security Considerations

Security issues are not addressed in this memo.

Author's Address

    Fung Fung Lee
    Computer Systems Laboratory
    Stanford University
    Stanford, CA 94309

    Phone: +1 415 723 1450
    EMail: lee@csl.stanford.edu