

#182: How to Construct Word-Break Tables

See also: The Script Manager

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This technical note describes how to construct auxiliary break tables for use with the `FindWord` routine in the Script Manager.

Constructing break tables

The `FindWord` algorithm finds word boundaries by determining where words should not be broken. For example, “re-do” is one word: it should not be broken at the hyphen. In other words, a sequence of the form: (letter, hyphen, letter) should not be broken between the first and second or second and third character. This is called a continuation sequence. The algorithm used by the `FindWord` routine allows for continuation sequences of lengths one, two and three. Examples of a sequence of length two include (letter, letter), or (number, number). For a length of one, there is only one sequence, consisting of the characters of type `nonBreaking`: these characters are never separated from preceding or following characters.

For most scripts, this information about continuation sequences is packed into a table for use by the `FindWord` algorithm. (For complex scripts like Japanese, a different algorithm is used for portions of the script.) The default break tables for a given script can be overridden by a user-specified `breakTable` parameter, but should only be used for known scripts. That is, before overriding the `breakTable` parameter, the programmer should first check the script of the current font.

A break table consists of two sections, a 256 byte character type table followed by a character triple table.

\$00				blank				break
				.				.
\$30				numbe				numbe
				.				.
\$40				punct				letter
\$42				letter				letter
				.				.
\$FE				break				break

Character Type Table

limit (# entries – 1)		
	letter	letter
	<i>wild</i>	letter
	hyphen	letter
	letter	hyphen
	<i>wild</i>	letter
	number	dot
	.	.

Character Triple Table

The character type table is indexed by the character's ASCII code and contains one type value for each character. The character types in the table are limited to values between 1 and 31. There are two distinguishing values: the type `nonBreaking` (= 1) indicates that the character is non-breaking; it always continues a word. The type `wild` (=0) indicates that the character may or may not break, depending on information in the character triple table, as described below. Otherwise, the choice of numbers to represent character types is completely arbitrary.

For example, the following in MPW Assembler defines character types for use in a word-selection break table, then sets up a character type table using an assembly macro (`setByte`) to store character type values in an array. (Note that the character types could have been defined with equate definitions (`EQU`), rather than using the record structure.) Writing the `setByte` macro is left as an exercise to the reader. Note that the break value is the default. This value is not distinguished, but should have no continuation sequences.

```

;=====
charWordRec      record      0
wild             ds.b        1          ; constant! not in char table.
nonbreak        ds.b        1          ; constant! non-breaking space.
letter          ds.b        1          ; letters.
number          ds.b        1          ; digits.
break           ds.b        1          ; always breaks.
midLetter       ds.b        1          ; a'a.
midLetNum       ds.b        1          ; a'a 1'1.
preNum          ds.b        1          ; $, etc.
postNum         ds.b        1          ; %, etc.
midNum          ds.b        1          ; 1,1.
preMidNum       ds.b        1          ; .1234.
blank           ds.b        1          ; spaces and tabs.
cr              ds.b        1          ; add carriage return
               endr

;=====
               with          charWordRec
wordTable
    dcb.b       256,break
    setByte     wordTable,nonBreak,$ca
    setByte     wordTable,letter,('A','Z'),('a','z'),('Ä','ü')
    setByte     wordTable,letter,'Æ','Ø','æ','ø','À','æ'),'ÿ'
    setByte     wordTable,midLetter,'-'
    setByte     wordTable,midLetNum,$27,' '
    setByte     wordTable,number,('0','9')
    setByte     wordTable,preNum,'$','¢','£','¥'
    setByte     wordTable,postNum,'% '
    setByte     wordTable,midNum,', '
    setByte     wordTable,preMidNum,'.'
    setByte     wordTable,blank,$00,' ', $09
    setByte     wordTable,cr,$0d
    endWith
;=====

```

The character triple table is a coded representation of a list of continuation sequences. It consists of a list of packed one word triples, preceded by a length word. This length word contains the number of triples minus one. Each triple contains three character types, either as derived from the `charType` table or the special type `wild` (= zero). The three types in a triple are packed into fields five bits apiece, with the most significant bit in the word cleared. The first type in the triple is the leftmost.

A continuation sequence of length three (xyz) is represented by entering three triples into the triple list: xyz, *xy, and yz* (where '*' stands for the type wild, which is always zero).

letter	hyphen	letter		hyphen	letter	wild
				letter	hyphen	letter
				wild	letter	hyphen

A continuation sequence of length two (xy) is represented by entering two triples into this list: *xy, and xy*. A continuation sequence of length one has no entry in the triple list: the character type is simply `nonBreaking`.

letter	letter		letter	letter	wild
			wild	letter	letter

Note that the type `wild` cannot appear as the middle element of a triple. The words in the triple table must be sorted in ascending numerical order for future compatibility.

The following is an example of how a character triple table could be coded. The `defSeq` macro takes a continuation sequence as a parameter, and enters a set of triples into an internal array. The `dumpSeq` macro sorts the triples, and stores them in the proper order with `dc.w` commands. Once again, writing the macros `defSeq` and `dumpSeq` is left as an exercise for the reader.

```

;=====
    with      charWordRec
    defSeq    letter,letter
    defSeq    letter,preMidNum,letter
    defSeq    letter,midLetter,letter
    defSeq    letter,midLetNum,letter

    defSeq    number,number
    defSeq    number,letter
    defSeq    number,midNum,number
    defSeq    number,midLetNum,number
    defSeq    number,preMidNum,number
    defSeq    number,postNum
    defSeq    preNum,number
    defSeq    preMidNum,number

    defSeq    blank,blank
    defSeq    blank,cr
    endWith

;=====
    dc.w      ((wordEnd-wordBegin)/2)-1    ; length word.
wordBegin
    dumpSeq
wordEnd
;=====

```

A series of blanks should generally select as a single word. Make certain, however, that a carriage return does not continue a word to the right (note how it has a separate character type from blank for this reason), otherwise word selection and wrapping do not work properly across paragraphs.

Extensions

The values 16-31 in the character type table entry for null (\$00) (the first byte in the character type table) are reserved by Apple for future expansion. The use of one of these values indicates the presence of a supplementary table after the triple table.