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Identification

Generating Unique Identifiers
unique_bits, unique_chars, when_created
L. B. Ratcliff

Purpose

The procedures, unique_bits and unique_chars, provide the user with a source of identifiers (bit-string or character-string) guaranteed to differ from all other identifiers generated by these procedures. The procedure, when_created, is useful to the user who wants to determine the time at which a specific identifier (character string) was created.

Discussion

A unique 70-bit string is assured by concatenating the 18-bit processor serial number with the low-order 52 bits of the Multics calendar clock obtained by executing the rccl (read calendar clock) instruction. The resulting identifier will remain unique for 140 years. Uniqueness is guaranteed with a single system if two processors cannot access one clock simultaneously, and between systems because the processor serial number is unique. The planned implementation of the calendar clock requires that two processors not access the clock simultaneously. A change in implementation permitting simultaneous access would require that the procedure unique_bits be inhibited between accessing the clock and obtaining the processor serial number.

Usage

A unique bit string is obtained by executing the statement:

```
bit_string = unique_bits;
```

with the declaration:

```
dcl bit_string bit (70), unique_bits ext entry bit (70);
```

A unique character string is obtained by executing the statement:

```
char_string = unique_chars;
```

with the declaration:

```
dcl char_string char (15), unique_chars ext entry
char (15);
```

The first character in the string is always ! (exclamation point) to identify the string as a unique identifier. The remaining 14, forming the unique identifier, are alphanumeric.

To obtain the time of creation of a unique character string, the user executes the statement:

```
call when_created (char_string, time, processor);
```

where char_string is described above, time is a 71-bit fixed binary integer and processor is an 18-bit string. If when_created ascertains (by checking to see if char_string is of the form and composition described below) that the character string was not created by unique_char, it signals an error. Otherwise, it returns with time containing a calendar clock time and processor containing the 18-bit serial number of the processor used to create the identifier.

Implementation Notes

Procedure unique_bits calls the PL/I built-in abnormal function "clock_" (see BP.0.03) to obtain the current clock time, and obtains the processor serial number from pds\$processor_number (the processor data segment, pds, is described in BK.1.02). Unique_bits returns the 70-bit string, bit_string, containing

```
processor_number||clock time
```

Procedure unique_chars calls unique_bits, then creates the corresponding character string.

The character string has the form

```
!C C ...C
 1 2     14
```

Each character, C_i ($i = 1, \dots, 14$) is determined by the value (j) of the i -th 5-bit byte of the 70-bit string. The character C_i is the j -th entry in a table of 32 characters which are

upper case alphabet except vowels, R, S, T, V and Y

lower case alphabet except vowels, r, s, t, v and y

in the order listed. Vowels are eliminated to avoid profanity; V, v, Y, and y are eliminated because they suggest U, u, I, and i. The other s x consonants are eliminated because of their frequent occurrence in normal identifiers. Procedure when_created is related to unique_chars only in that it is aware of the algorithm used in creating the character string. It reverses the algorithm to obtain the original 70-bit string, then extracts the 52-bit clock time and processor serial number.

The three procedures are slave with slave access.