Eine Genealogie höherer Programmiersprachen

Zusammengetragen von der Forschungsgruppe Softwarearchäologie am Von Leitner-Institut für verteiltes Echtzeit-Java

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Outline

Languages of Historical Interest

FORTRAN

ALGOL

COBOL

APL

BASIC

Encore

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- “Old” >20 Years
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Jack o’ Lanterns

- Languages that never “took off”
- Often innovative and influential

FORTRAN

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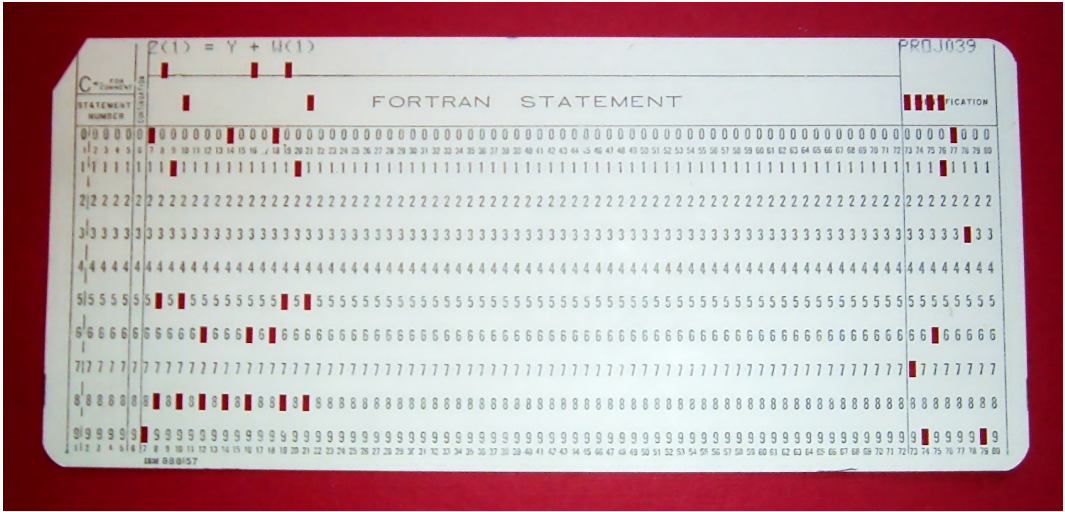
Consistently separating words by spaces became a general custom about the tenth century A.D., and lasted until about 1957, when FORTRAN abandoned the practice.

Sun FORTRAN Reference Manual

FORTRAN66 Example Program

```
C INPUT - CARD READER UNIT 5, INTEGER INPUT, ONE BLANK CARD FOR END-OF-DATA
C OUTPUT - LINE PRINTER UNIT 6, REAL OUTPUT
  501 FORMAT(3I5)
  601 FORMAT(4H A= ,I5,5H  B= ,I5,5H  C= ,I5,8H  AREA= ,F10.2,
     $13H SQUARE UNITS)
  602 FORMAT(10HNORMAL END)
  603 FORMAT(23HINPUT ERROR, ZERO VALUE)
      INTEGER A,B,C
   10 READ(5,501) A,B,C
      IF(A.EQ.0 .AND. B.EQ.0 .AND. C.EQ.0) GO TO 50
      IF(A.EQ.0 .OR.  B.EQ.0 .OR.  C.EQ.0) GO TO 90
      S = (A + B + C) / 2.0
      AREA = SQRT( S * (S - A) * (S - B) * (S - C) )
      WRITE(6,601) A,B,C,AREA
      GO TO 10
   50 WRITE(6,602)
      STOP
   90 WRITE(6,603)
      STOP
      END
```

A Punched Card with FORTRAN Code



FORTRAN95 Example Program

```
PROGRAM test
   CALL print_message
END PROGRAM test
SUBROUTINE print_message
   PRINT *, 'Hello world!'
END SUBROUTINE print_message
```

ALGOL

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[ALGOL 60] is a language so far ahead of its time, that it was not only an improvement on its predecessors, but also on nearly all its successors.

C. A. R. Hoare 1973

Simple ALGOL60 Example

```
procedure Absmax(a) Size:(n, m) Result:(y) Subscripts:(i, k);
    value n, m; array a; integer n, m, i, k; real y;
comment The absolute greatest element of the matrix a, of size n by m,
↪  is transferred to y, and the subscripts of this element to i and k;
begin
    integer p, q;
    y := 0; i := k := 1;
    for p := 1 step 1 until n do
        for q := 1 step 1 until m do
            if abs(a[p, q]) > y then
                begin y := abs(a[p, q]);
                    i := p; k := q
                end
end Absmax
```

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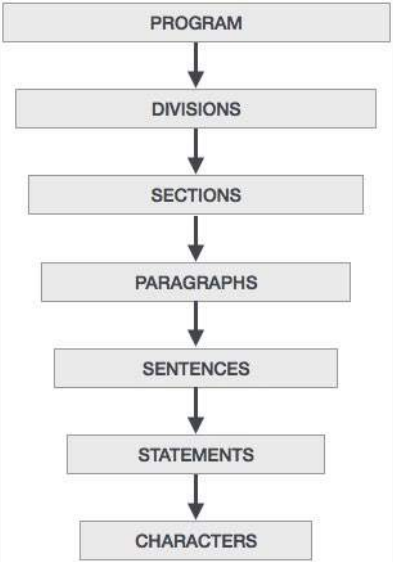
The use of COBOL cripples the mind; its teaching should, therefore, be regarded as a criminal offense.

Edsger W. Dijkstra

The Hierachical Structure of COBOL



A Simple COBOL60 Example

```
IDENTIFICATION DIVISION.
PROGRAM-ID. HELLO.

DATA DIVISION.
    WORKING-STORAGE SECTION.
    01 WS-STUDENT-NAME PIC X(25).
    01 WS-DATE PIC X(10).

PROCEDURE DIVISION.
    ACCEPT WS-STUDENT_NAME.
    ACCEPT WS-DATE FROM DATE.
    DISPLAY "Name :  " WS-STUDENT-NAME.
    DISPLAY "Date : " WS-DATE.

STOP RUN.
```

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Common Operators

Monadic			Dyadic					Higher Order	Misc
?	*	⌽	+	⌈	,	⍒	>	/	¯
⌈	-	⊖	-	⌊	\	⍋	≠	⌿	⍟
⌊	+	⍋	×	⍴	/	!	∨	\	→
⍴	×	⍒	÷	↑	⍳	⍠	∧	⍀	←
~	÷	⍎	*	↓	⍞	<	⍲	.	
|	,	⍒	○	⊥	⌽	≤	⍱	∘.	
⍳	⍞	⍋	?	⊤	⊖	=			
⍟	○	!	∈	|	⍟	≥			

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- Element of operator and negation: `1 1 0 1 0`
- Reduction: `2 3 5`

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It is practically impossible to teach good programming to students that have had a prior exposure to BASIC: as potential programmers they are mentally mutilated beyond hope of regeneration.

Edsger W. Dijkstra

GW-BASIC Example Program

```
10 INPUT "What is your name: "; U$
20 PRINT "Hello "; U$
30 INPUT "How many stars do you want: "; N
40 S$ = ""
50 FOR I = 1 TO N
60 S$ = S$ + "*"
70 NEXT I
80 PRINT S$
90 INPUT "Do you want more stars? "; A$
100 IF LEN(A$) = 0 THEN GOTO 90
110 A$ = LEFT$(A$, 1)
120 IF A$ = "Y" OR A$ = "y" THEN GOTO 30
130 PRINT "Goodbye "; U$
140 END
```

Encore

Further Developments

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- 1972 C
  - Root of all evil
  - TIOBE rank: 2

Duff’s Device

```
int main() {
    register short *to, *from;
    register count;
    {
        register n = (count + 7) / 8;
        switch (count % 8) {
            case 0: do { *to = *from++;
            case 7:      *to = *from++;
            case 6:      *to = *from++;
            case 5:      *to = *from++;
            case 4:      *to = *from++;
            case 3:      *to = *from++;
            case 2:      *to = *from++;
            case 1:      *to = *from++;
                } while (--n > 0);
        }
    }
}
```