



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
4100 TRIESTE (ITALY) - P.O. B. 586 - MIRAMARE - STRADA COSTIERA 11 - TELEPHONE: 224221/2/3/4/5/6
CABLE: CENTRATOM - TELEX 460392-1

SMR/90 - 39

COLLEGE ON MICROPROCESSORS:
TECHNOLOGY AND APPLICATIONS IN PHYSICS

7 September - 2 October 1981

SUPPLEMENT TO "PROGRAMMING TOOLS AND TECHNIQUES"

C. HALATSIS

Physics and Mathematics Dept.
Digital Systems and Computers Lab.
University of Thessaloniki
Thessaloniki
Greece

These are preliminary lecture notes, intended only for distribution to participants. Missing or extra copies are available from Room 230.

Structuring features of ASZ ASSEMBLER (8080, 286) AND PLZ-ASM (Z80)

- ARRAYS & RECORDS DEFINITIONS
- LOOP REPEAT (NEVER ENDING LOOP) EXIT
DO OD IF ... THEN EXIT FI
- BEGIN ... END
- VIA clause : LOOP VIA ...
EXIT VIA
- IF ... THEN ELSE ... FI
- PROCEDURE DEFINITION & CALL

MACHINE DEPENDENT HCLs

Expressions & operands reflect μP instruction set

1) Smal/80, BSAL/80 (8080, 8085, 286)

if ... then ... else
loop repeat
loop repeat while ...
operands addressed by registers, M(HL)
Increments/decrements ++HL, --DE like C

2) Mistral (M 6800 by Zell Labr)

if ... then ... else
while ... do ...
repeat ... until ...
loop begin exit if ... and
Program structure: main-program and
procedures

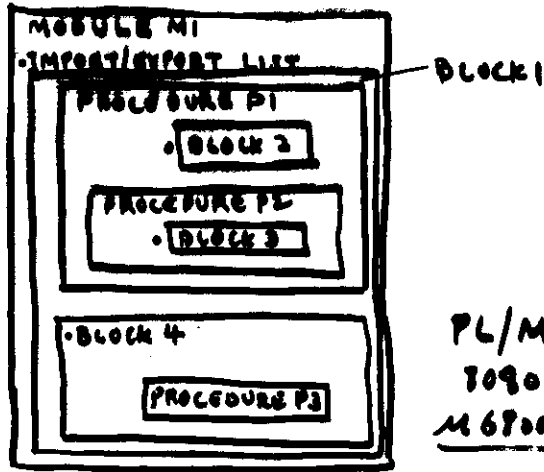
3) PL/65 (Rockwell R6502)

As above structures plus
case statement
Optimization pass
More complex expressions than above

MP-ORIENTED (BUT NOT DEPENDENT) HLL's

MULTI-LEVEL

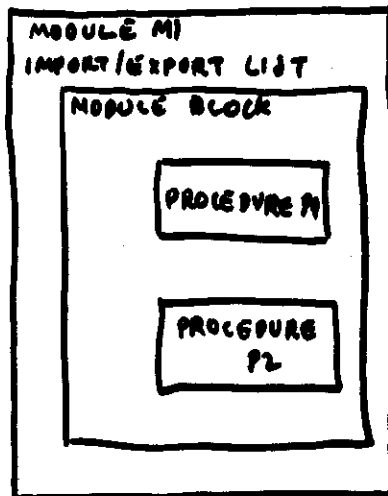
it overtakes
PASCAL !!



PL/M, PLUS
Z80 Signetics
M6800 2650

1) PROGRAM STRUCTURES - SCOPING RULES OF ALGOL 60

TWO-LEVEL



PLZ-SYS
Zilog Z80
Z8000
Olivetti

Unstructured

MPL
M6800 M68000

MP-ORIENTED HLL'S (CONTINUED)

2) Data types, operators, and expressions

Rule: the language should support exactly those data types and operations which can be easily handled by the hardware

3) Control structures

MPL	if ... then if ... then ... else	goto (X)	do ... do while	go to
PLUS	if ... then if ... then else	case (X)	do ... do while do until	go to
PL/M	if ... then if ... then ... else	case (X)	do ... do while	go to
PLZ-SYS	if ... then ... fi if ... then ... else ... fi	goto (...)	do ... od	go to

4) Memory allocation

PL/M, PLZ-SYS data static allocation
stack dynamic

PLUS static allocation

MPL controlled by the user as
in the assembly language.

CONCLUSIONS

- IF MEMORY OCCUPATION OR SPEED IS OF PRIMARY IMPORTANCE A STRUCTURED ASSEMBLER SHOULD BE CHOSEN
- IF NOT FAMILIAR WITH ASSEMBLER OR WANT TO IMPROVE PROGRAM READABILITY USE A MACHINE-DEPENDENT HLL.
- FOR ALL OTHER APPLICATIONS USE EITHER A MP-ORIENTED HLL IF TIME/SPACE EFFICIENCY IS STILL IMPORTANT
- OR USE A SYSTEMS HLL IF QUICK COMPLETION, EASE OF MAINTENANCE, AND PORTABILITY ARE OF PRIMARY CONCERN

PROBLEM

$$C_{L \rightarrow A}^{WA}, C_{L \rightarrow B}^{WL} \Rightarrow C_{L \rightarrow B}^{WB}$$

SOLUTION

