TO: MSPM Distribution
FROM: C. Garman, M. Meer
SUBJECT: Re-issue of BZ.7.00, POPS Overview
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The overview of POPS has been re-issued to provide an
expanded view of the relationships involved in working
with POPS and POPS-described compilers, and as an attempt
to clarify any confusion that may have arisen in this
regard.

It also supersedes the Addenda, BZ.7.00A, 09/20/68.

Identification

POPS Overview
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POPS are machine instructions for a pseudo-computer simulated
on the GE-645. This pseudo-computer was designed specifically
for writing compilers and assemblers. Each POP corresponds
to a GE-645 machine language subroutine. In order to execute
a POPS language program, an interpreter interprets each POP
and calls the proper subroutine.

The POPS interpreter operates under Multics. It is currently
being used by FL and FORTRAN, both of which are written in
POPS language.

The following comments describe the relationships which exist
between

1) The FL command-and-translator and the POPS interpreter,

2) The FORTRAN command-and-translator and the POPS
interpreter and,

3) A hypothetical POPS command-and-translator and the
POPS interpreter.

Since FORTRAN and FL do not differ with respect to these
relationships, only FL will be described; FORTRAN is analogous
to, and parallels, this description. In addition, the POPS
will be described.

The FL (FORTRAN) command program (itself coded in EPL) serves as
the interface between the POPS interpreter and the rest of the
Multics system. When the command is invoked, it gets pointers
to the source segment, the POPS driver tables for the particular
translator, a copy of the template data segment associated with the
particular translator, and all other intermediate and output
segments. The appropriate pointers are placed in that part of
the data segment used to communicate with the POPS interpreter.
The POPS interpreter program is then called; upon return the
command program wraps up the output segments leaving them in the
user's working directory.

The particular translator or POPS driver is a table which is
interpreted by the POPS interpreter. It may be a read-only or
read-and-execute segment (the latter if an escape to machine code
has been used).

The interpreter is a pseudo-machine which executes the
instructions coded into a given driver table.

While a POPS command could be constructed to translate POPS
"source language"-code into the form required for a POPS driver
table, neither such a language nor such a translator exists.
Instead, the POPS "instructions" are coded using the FL/I syntax,
and the FL command is invoked with special options such that the
POPS interpreter is given an extended symbol table in the tem-
plate data segment which contains a set of definitions for the

POPS "language" mnemonics in terms of the FL language functions.
A special handler in the definition of the FL translator
assembles the POPS instructions into the appropriate form.
Thus all the other facilities of FL from macros and pseudo-
ops to actual machine language are available for use in
coding a "POPS Language" program.

Finally, in creating a POPS program ("driver table") it is
necessary to assemble the template data segment under one
counter and the POPS instructions under another counter. Two
passes through FL are now necessary, the first to assemble the
data segment as the output text and the second to assemble
the POPS instructions as the output text and the data segment
as an external segment for proper address references.

MSPM sections BZ.7.01 and BZ.7.02 describe the GE-645 interpreter,
the POPS language, and the POPS machine which is simulated by
the interpreter. These sections are written in manual form.
The Contents for the manual appear in this overview.

All examples in the manual are coded in the FL/I syntax.
Chapter 1, Paragraph B.1. gives a brief description of FL/I
syntax. Further details are contained in the <u>FL/I User's
Manual</u> to be published shortly.

For information on the GE-645 hardware and related data on the

Multics operating system, see the following documents:

GE-645 System Manual

GE-625/635 Programming Reference Manual, CPB-1004

MSPM BD.1.   The Segment Symbol Table

MSPM BD.7.   Intersegment Linkage

MSPM BX.7.01   The fl Command

MSPM BX.7.02   The FORTRAN Command

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