

a small subset of all possible sequences, and it does not work. It does, however, provide an upper bound on efficiency. Presently an algorithm is being considered which looks at a well-defined set properly containing the too-small one and properly contained in the lower-efficiency-bound one. If the algorithm works, then an attempt will be made to reduce the set; if it does not, then an attempt at expansion.

It is not expected that the extension of an algorithm to the consideration of control structures will be difficult.

References to Related Work:

- (1) Beatty, J. C. An Axiomatic Approach to Code Optimization for Expressions. Journ. ACM 19, 4 (October 1972), 613-640.
- (2) Nakata, Ikuo. On Compiling Algorithms for Arithmetic Expressions. Comm. ACM 10, 8 (August 1967), 492-494.
- (3) Redziejowski, R. R. On Arithmetic Expressions and Trees. Comm. ACM 12, 2 (February, 1969), 81-84.
- (4) Sethi, Ravi and Ullman, J. D. The Generation of Optimal Code for Arithmetic Expressions. Journ. ACM 17, 4 (October 1970), 715-728.

Documentation:

Existing Documentation:

- (1) Apperson, J. L. Proposal for a Thesis on Optimal Evaluation Order for Expressions with Redundant Subexpressions. January, 1973. (To obtain, write: J. L. Apperson, CMU)

Potential Documentation:

A Ph.D. thesis expected to be published around September, 1973. To obtain, write: CMU.

Name of Contacts for Future Reference:

- (1) J. L. Apperson, CMU.
- (2) W. A. Rulf, CMU.

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* FRAME PROGRAMMING LANGUAGE
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NAME OF PROJECT: Frame Programming Language

ORGANIZATION: Office of Medical Information Systems
University of California, San Francisco

INVESTIGATORS: M.S. Blois, R.R. Henley, and P. LeBeux

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PROJECT DESCRIPTION:

Objectives: Development of real-time interactive systems to be used in the medical environment.

Starting Date: January 1, 1972

Estimated Completion Date: June 30, 1974

Current Status: A first version of the language is being developed to build a prototype for a frame selection system.

Computer Being Used: Four Phase 70, Model B

Languages Involved: FPL (frame programming language)

FPL (frame programming language) - The purpose of the project is to develop an interactive problem-oriented language that can be used with a minimal amount of training and programming experience.

The basic data structure of the language is the frame which is defined as a set of alternatives (chosen in the universe of discourse of a specific problem) presented to the user in a structured fashion.

The language, FPL, is designed to build interactive systems called frame selection systems where the user is able to create messages by concatenation of words or phrases selected from a succession of frames presented on a CRT display.

The language itself is implemented as a frame selection system and involves the following steps:

- creation and storage of frames in a static file
- programming of the selection processes and compiling of the code which will determine the behavior of the frame selection system

For each selection, one or more of the following options may be invoked:

- the string selected may be added to a message buffer and presented on top of the screen
- an associated string may be concatenated to the message and displayed
- a special procedure may be invoked (resident or overlay) and executed immediately after the selection (display of data file, storage, retrieval, etc.)
- a delayed process may be invoked (resident or overlay) as a middle ground or background task (printing process, search in the data base, etc.)
- a new frame might be displayed as a result of the selection

The main departures of the language from classical programming are:

- the concept of selection process which relieves the user from typing errors, misspellings, syntactical errors, etc.

- the possibility of invoking computational processing as a result of a selection
- the flexibility and extensibility of the language
- the ease with which one can learn the language and implement a particular frame selection system.
- the frame structure which is more flexible and powerful than the usual data structures.

DOCUMENTATION:

Existing Documentation

- implementation of a frame system and language (P. LeReux, R.R. Henley)

Potential Documentation

- the frame system user's manual (P. LeReux, September 1973)
- FLP user's manual (P. LeReux, December 1973)

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