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BINARY PROCEDURES AND PROGRAMS WITH LOOPS

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ethod is proposed for the evaluation of a system of Boolean formulas using a gram with a loop in which some parameters generated by a previously created ay are successively passed to a special procedure. The program with a loop is ned a cyclic binary program, and the procedure is termed a tunable binary cedure. Basic design principles and complexity bounds are considered.

INTRODUCTION

re is an ever-growing interest in program realization of systems of Boolean functions sing compilers [1, 2] and interpreters [3]. Interpretation is the more promising in those cases when no special requirements are imposed on the time characteristics rogram. An interpreter is independent of the Boolean functions being realized, and tions are specified by an array [3]. However, the generation and updating of such for the specification of SBF with many variables and formulas is an arduous and suming task. If we can abstract from issues of time and memory optimization, which primary concern of [1, 3], and focus on simplicity of the realizing procedure (as in ula method proposed in [1]), the interpreter may be designed as a cyclic program cludes a general-purpose compiler procedure with parameters. Then the specified SBF epresented by a table (array) of parameters, and formula evaluation reduces to sequential enumeration of the table rows and substitution of the row parameters general-purpose procedure.

this article we consider some principles of organization and construction of tunable rocecures, parameter tables, and cyclic binary programs for SBF evaluation. Appro- omplexity bounds are given.

ble Binary Procedures

sider a SBF of the form

$$W_1=Z_1\vee Z_2\vee Z_3;\quad W_2=Z_1Z_2\vee Z_3;$$
$$W_3=(Z_1\vee Z_2)Z_3;\quad W_4=Z_1Z_2Z_3. \qquad (1)$$

ure 1 presents graph-schemas (GS) of simple binary programs realizing these formulas. ombine the GS of the separate formulas into a generalized GS (Fig. 2a), which con- a simple binary program with four inputs and one output (Fig. 2b). To reduce the f inputs, we introduce the additional variables Z_4 and Z_5, which are called formula- arameters: $Z_4 = Z_5 = 1$ tune to W_1, $Z_4 = 1$ and $Z_5 = 0$ tune to W_2, $Z_4 = 0$ and $Z_5 = 1$ W_3, and $Z_4 = Z_5 = 0$ tune to W_4. Supplementing the GS with three nodes (Fig. 2c), we he GS of a binary program which constitutes a procedure evaluating any of the in (1); this procedure may be utilized as a subprogram with the parameters Z_4 and nay be designed as a function subprogram since computations with any of the formulas the value of W equal to 1 (0). The resulting function procedure (Fig. 2c) will be tunable binary procedure (TBP), which we denote by $W = W(Z_4, Z_5)$. Its tuning in- ssigning the constant values 1 and 0 to the parameters Z_4 and Z_5. The formulas (1) evaluated using the following relationships:

$$W_1=W(1,1);\quad W_2=W(1,0);\quad W_3=W(0,1);\quad W_4=W(0,0). \qquad (2)$$

GS in Fig. 2c realizes the function

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