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INTRODUCTION

The ODRA 1204 computers are a fast digital computers designed for scientific, technical and economic applications.

- ODRA 1204 is based upon a 24 - bit word
- instructions allow to manipulate 24 - bit and 48 - bit numbers
- one - adress format of an instruction makes possible:
  - — index modification (3 index registers in each program) and indirect addressing
  - — recursive indexing and indirect addressing
- each memory cell or each program register can function as a modifier
- modification can be accomplished by means of single or double contents of modifier
- floating point operations are fully automatic
- each program containg 8 extracode instructions
- information flow through channel is fulby automatic
- all informations transfers are checked
- priority system of interrupting and resuming the program execution is built - in
- 4 levels of priority interrupt in a channel
- internal interrupt indicates the program errors or malfunctions

ODRA 1204 CENTRAL PROCESSOR

INTEGRAL PARTS

— arithmometer
— core storage
— permanent memory
— operations channel
— channel coordinating unit

EXTERNAL PARTS

— operator's desk
— console typewriter

Arithmetic — binary

Word lenght — 24 informations bits

Core store — 16 K words, cycle time 6 μsec

Speed of basic informations:

— fixed point:
addition — 16 μsec
multiplication — 80 μsec

— floating point:
addition — 145 μsec
multiplication — 360 μsec

ODRA 1204 PERIPHERAL EQUIPMENT

INPUT/OUTPUT DEVICES

- paper tape readers
  1000 ch/sec (8-track)
- paper tape punch
  100 ch/sec (8-track)
- line printer
  1350 lin/min (maximum)
  print positions — 120 per line
  64 characters:
  - — alphabetic
  - — numeric
  - — special

EXTERNAL STORAGE

- 2 to 4 magnetic drums, capacity of each drum 64 K words

EQUIPMENT FOR THE PREPARATION OF PAPER TAPE

- typewriter with reader and punch

OPERATING SYSTEMS

SOW

This system performs:

1. Detecting - diagnostic functions, that is, it displays the possible malfunctions in:
   - — peripheral equipment
   - — central processor arithetic unit
   - — simultaneous running object programs of translator and system without mutual interference
   - — object program operation
2. Executing - monitoring function which consists in starting and monitoring data transmission from (to) input/output equipment:
   - — from the paper tape reader
   - — to the paper tape punch
   - — from the monitor as an input or supervisory device
   - — to the monitor as an output or monitoring device
3. Communicating function between the operator and the Central Processor of the operating - - executing system allows:
   - — to record the operators actions and the program running
   - — to intervene during the program running for the purposes of program debbuging, suspending, resuming
   - — to analyse precisely the causes of the program failures.

SODA

SODA is operating system attended for ODRA 1204 computer configuration with the drum storage having minimum capacity of 128 K words.

System SODA has the following functions:

- — organises and supervises the preparing (compilation) of one use program and in the same time executes one use program (programs may wait in drum storage for executing)
- — initiates and executes data transmision from (or to) central processor units to (or from) input/output peripherals and drumx storage
- — executives comunication operations between the operator and the centrall Unit:
  - — decode and executives differents operator's input directives,
  - — prints massages (program errors, and of transmitions, and of compilation program, etc.)

PROGRAMMING LANGUAGES

J A S — THE SYMBOLIC ASSEMBLY LANGUAGE

The Symbolic Assembly Language facilitates writing programs in the machine language and permits to utilize in full the machine potentialities.

Programs written in the Symbolic Assembly Language comprises:

— mnemonic code instructions

— macroinstructions

— pseudo-instructions

— constants

— texts

Macroinstructions are intended to abbreviate writing of complex operations, to call down standard subroutines in a simple manner and to communicate more closely with the operating system.

The pseudoinstructions allow more powerful coding techniques by easy declaration of symbols, division into sections within which it is possible to utilize the symbols appearing in other sections.

Symbolic addresses can be:

— numerical

— symbolic

— combinations of symbols and constants (alphanumeric).

M O S T - 2 AUTOCODE

The autocode MOST - 2 is a simple of automatic programming.

When using the MOST - 2, it is possible to write programs by means of readable formulas. This autocode facilitates the organization of cyclic and iterative programs. Arithmetic instructions of the autocode MOST - 2 can contain:

— unindexed and indexed variables

— arithmetic expressions written in a full line

— all standard functions

The instructions of conditional jumps possess:

— three branch points for negative and positive values and for zero

— two branch points with depressed or undepressed key on the console.

The instructions of conditional jumps compare of two arithmetic expressions.

Program cycles can be executed from a given value to another one with a prescribed step:

— from a given value with a prescribed step and a predetermined multiple

— for specified values.

Programs written in the autocode MOST - 1 run on the digital computer ODRA 1204 without changes.

A L G O L 60

This an algorithmic language commonly used to write the programs for solving numerical problems. The full version of the ALGOL is implemented in the digital Computer ODRA 1204.

LIBRARY SUBROUTINES & SOFTWARE PACKAGES

ALGEBRAIC PROGRAMS

- Subroutine for addition and substraction of matrices.
- Subroutine for the multiplication of a matrix stored in rows by a matrix stored in columns.
- Subroutine transposing a matrix.
- Subroutine inverting a matrix, Gauss - Jordan method.
- Subroutine inverting the symmetrical matrix.
- Routine Inverting a matrix, Gauss - Jordan method.
- Routine inverting the symmetrical matrix.
- Subroutine calculating own value of a matrix.
- Subroutine calculating latent roots of a matrix.
- Routine calculating the determinats.
- Routine solving linear symmetric equations, Gauss method.
- Routine solving algebraic equations of the 2 - nd, 3 - rd, and 4 - th order.
- Subroutine solving algebraic equations of the 2 - nd, 3 - rd, and 4 - th order.
- Subrouting calculating the roots of a polynom, Newton method.
- Subroutine calculating the zero place of function, Newton method.
- Subroutine calculating the zero place of function, regula falsi method.
- Subroutine calculating roots, method of equal division.
- Subroutine calculating roots, mixed method.
- Subroutine arranging numbers.
- Subroutine for multiplication of matrices stored in rows.
- Routine calculating equations, Wegstein method.
- Subroutine for multiplication the matrices by a matrix transposed.
- Subroutine transposing a matrix and calculating the determinant.
- Subroutine calculating the root of a given order.
- Subroutine solving streak linear equations.
- Routine solving streak linear equations.
- Subroutine solving symmetric streak linear equations.
- Routine solving symmetric streak linear equations.
- Group of integrated ruls.
- Subroutine of approximated calculating of algebraic linear equations, least squares method.
- Subroutine solving linear symmetric equations, Gauss method.
- Subroutine calculating own value of matrices.

LIBRARY SUBROUTINES & SOFTWARE PACKAGES

ANALYSIS

- Subroutine solving first order differential equations with variable step, Runge - Kutta method.
- Subrouting solving first order differential equations with fixed step, Runge - Kutta method.
- Subroutine solving second order differential equations with variable step, Runge - Kutta method.
- Subroutine solving second order differential equations with fixed step, Runge - Kutta method.
- Subroutine solving a system of ordynary differential equations, method using Taylor series for rational right sides.
- Subroutine solving a system of ordynary differential equations, method using Taylor series for irrational right sides.
- Subroutine solving a system of first order differential equations with fixed step, Runge - Kutta method.
- Calculating of the gamma Euler function.
- Calculating of the Bessel function.
- Subroutine calculating integrals, Gauss method.
- Subroutine calculating integrals, Simpson method.
- Subroutine calculating integrals, Romberg method.
- Interpolation, Newton method.
- Nummerical differentiation of a function.

ALGOL PROCEDURES

- RUMI — calculation of a linear equations system having a big, number of zero - coefficients (Gauss - Seidel's iteration method)
- RUMEU — calculation of a linear equations' system having a big number of zero-coefficients (elimination method)
- DETGAUSS — calculation of a coefficient's matrix determinant and calculation of a linear equations' system using Gauss elimination method (Choice of the main element).
- INVDET — reversing and calculation of quadratic matrix determinant (sequence rotation method - in ALGOL or JAS)
- Q - R — calculation of own matrix values (with real coefficients) using Q - R method
- Subroutines for matrix operations
- Algol procedures for complex matrix operations

LINEAR PROGRAMMING

- SIMPLEX method
- PERT — set of programs
- Transport problems

STATISTIC

- Routine calculating the correlation coefficients, complete, partial and multiply
- Routine calculating regression coefficients
- Routine generating random numbers

OTHERS

- Set of programs for electro-energetic computation:
  - — Programs for long-term planning
  - — Programs for day-cycle computation
  - — Programs for network computation
  - — Engineering programs
  - — Statistical programs