The BBC PEARL Subset PAS2

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1. Scope of Language

The BBC PEARL subset PAS2 is a comprehensive
subset of PEARL 73. The selection of language
elements was substantially influenced by process
automation projects that reach from the smallest
applications to complex multi-computer systems
on one hand and from process-oriented scientific
and technical installations to management
applications on the other.

2. Hardware Requirements

The compilation of the source programs can be
done either on a host computer with a PL/I
compiler (for example IBM 370), or on a target
machine of the type PDP 11/34 to PDP 11/70.
In the latter case, 64k words and an external
memory (for example RK 05, RL 01, RK 06, RK 07)
are required. (A floating point processor is
not necessary.)

3. PEARL Software System

We regarded the language as an important compo-
nent, but not as a component capable of standing
alone in a user oriented programming system for
process-control applications.

3.1 Compiler

The compiler itself is written in the high-order
programming language PL/1. As shown in figure 1,
it is divided into several self-contained phases.

During test and compilation of the source
program about 500 different errrors can be
recognized and identified in more detail.
(e.g. by statement number, object name, as
well as detailled supplementary reports).

During compilation the following lists are
generated:

- A source program listing with supplementary

references to statement numbers, block levels,
levels nesting, relative addresses, as well
as additional information about e.g. size of
module, date of generation, and compilation
time.

- A cross-reference list in which the location
  of declaration, the complete set of attributes,
  and the occurrence of each individual object
  in the statements are listed.

- A list of all global objects including all
  attributes.

Special compiler directives allow to generate
optimized code either with respect to space
or to time.

3.2 Linkers

Special emphasis is also laid upon early error
recognition during link-time. Means to this end
are e.g.:

- Test of global variables with respect to
  attribute equivalence and resolved references.

- Protocolling of date of generation compilation
  time, and name of each module to be linked.

- Sum Checks of the object code of each module.

3.3 BBC PEARL Operating System

The BBC PEARL Operating System (POS) was
developed especially to support the capabilities
of PEARL. The operating system including the
drivers for standard and process peripherals
was written in an optimized form with the
assembler code of the object machine. Thus,
the PEARL application programs achieve run times
and reaction times that have proved very satis-
factory in a multitude of time-critical projects.

For a variety of errors (ca. 240) which are de-
tected at run time, the operating system provides
messages that contain the following information:

- Task in which the error occured,
- Time at which the error occured and
  (as far as relevant)
- Backtrace addresses (module name and relative
  address) with respect to all active block levels.
- Device involved
- Further supplementary information.

The occurrence of an error - either results in a
predefined action by the operating system or
can be wandled by the user (ON condition).
For this purpose the user is supplied with
additional information at the time of the
occurrence of the error, which allows him to
react in a defined way in his application
program.

3.4 Test system and Handling

The support system performs the following tasks:

- Setting of and inquiry after date and system
  time
- System initialization

- Data type specific response and modification
  of appropriate declared variables and arrays
  or array components in the source program.

- Complete reproduction of all tasking commands
  including the schedules of each task in the
  application program.

- Breakpoints for all executable statements
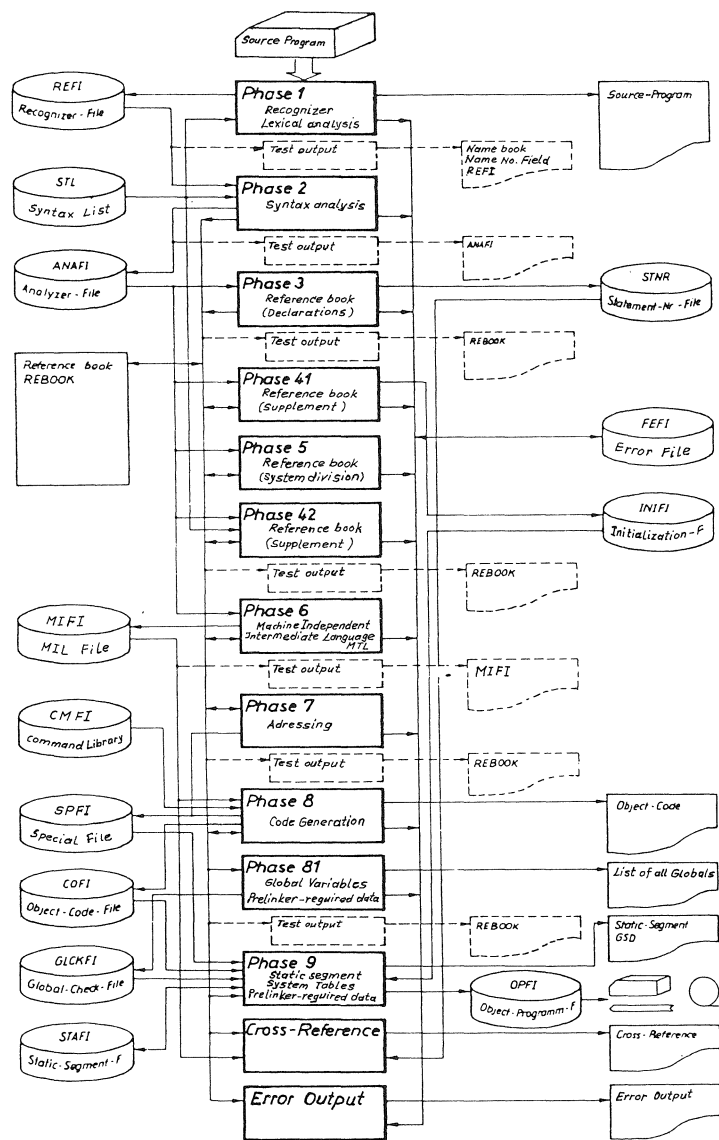 that are either resident in main memory, or

Fig. 1   Compiler Structure

loaded from external memory as 'overlay procedures'.

In addition, it can be stated whether the break-point shall be effective when the marked statement

- is executed for the first time or the nth time
- is executed by a specific task T_m.

Moreover, at breakpoints the user can chose between a shutdown of the entire system or suspension of the task causing the breakpoint (less influence on the real time environment).

4. PEARL Standard Packages

Developed by means of the BBC PEARL programming system, a number of standard packages have been developed and implemented:

- EOS/KYBODAT (Event oriented notation for control purposes),
- IMAGODAT (Table oriented notation of partially graphic color image systems),
- SES (Standard EVU System) for control of distributed energy supply nets.