Andhra Pradesh State Skill Development Corporation

Skill AP
APSSDC

eSkill AP
Learn Anytime Anywhere
Andhra Pradesh State Skill Development Corporation

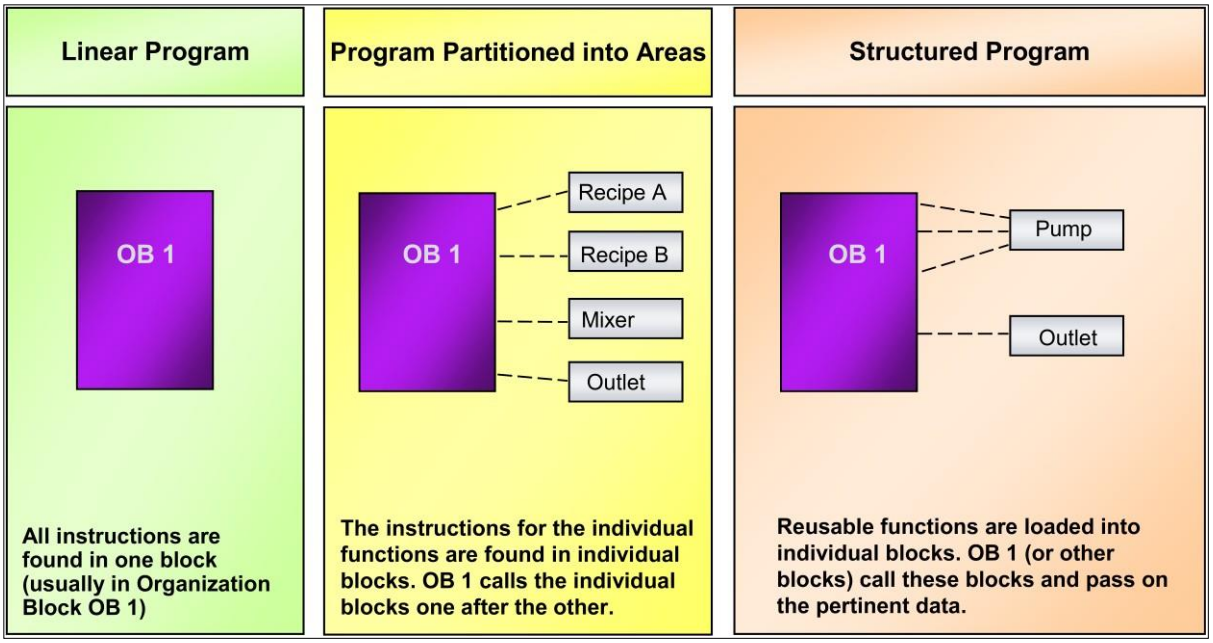
Basics of PLC

Structured Programming

Structured Programming

Linear Program

The entire program is found in one continuous program block. This model resembles a hard- wired relay control that was replaced by a programmable logic controller. The CPU processes the individual instructions one after the other.



Partitioned Program

The program is divided into blocks, whereby every block only contains the program for solving a partial task. Further partitioning through networks is possible within a block. You can generate network templates for networks of the same type. The OB 1 organization block contains instructions that call the other blocks in a defined sequence.

Structured Program

A structured program is divided into blocks. The code in OB1 is kept to a minimum with calls to other blocks containing code. The blocks are parameter assignable. These blocks can be written to pass parameters so they can be used universally. When a parameter assignable block is called, the programming editor lists the local variable names of the blocks. Parameter values are assigned in the calling block and passed to the function or function block.

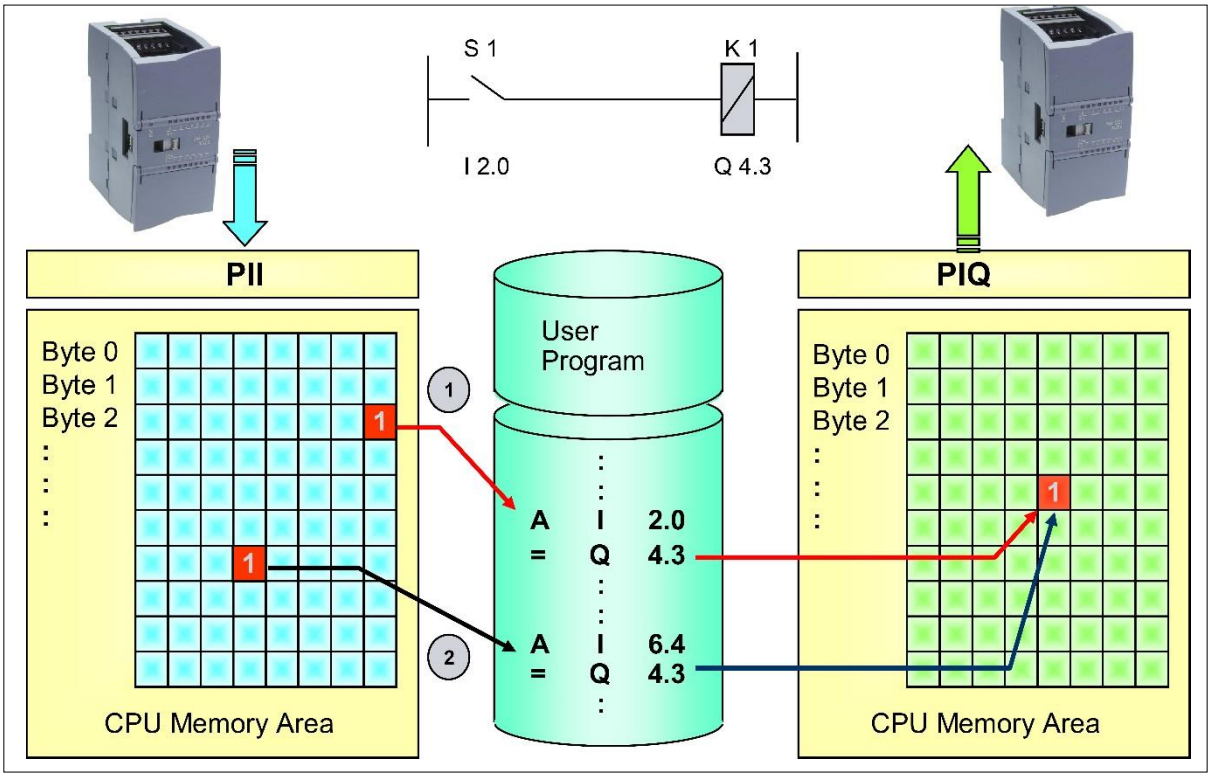
Example:

- A "pump block" contains instructions for the control of a pump.
- The program blocks, which are responsible for the control of special pumps, call the "pump block" and give it information about which pump is to be controlled with which parameters.

Process Images

Process Images

For the storage of all digital input and output states, the CPU has reserved memory areas: the process-image input table (PII) and the process-image output table (PIQ). During program execution, the CPU accesses these memory areas exclusively. It does not access the digital input and output modules directly.



PII

The Process-Image Input table is the memory area in which the states of all digital inputs are stored. The image is read in from the digital input modules at the beginning of the cycle. If inputs are queried in the user program (for example, A I 2.0), then the state of this input that is stored in the PII is queried from the PII. This state cannot change within a cycle since the PII is only updated or read in at the beginning of a cycle. This guarantees that when there are multiple queries of the input in one cycle, the same result is always delivered.

PIQ

The Process-Image Output table is the memory area in which the states of all digital outputs are stored. The image is output to the digital output modules at the end of the cycle. Outputs can be assigned as well as queried in the program. If an output is assigned a state in several locations in the program, then only the state that was assigned last is transferred to the particular output module (see slide). As a rule, these types of double assignments are programming errors.

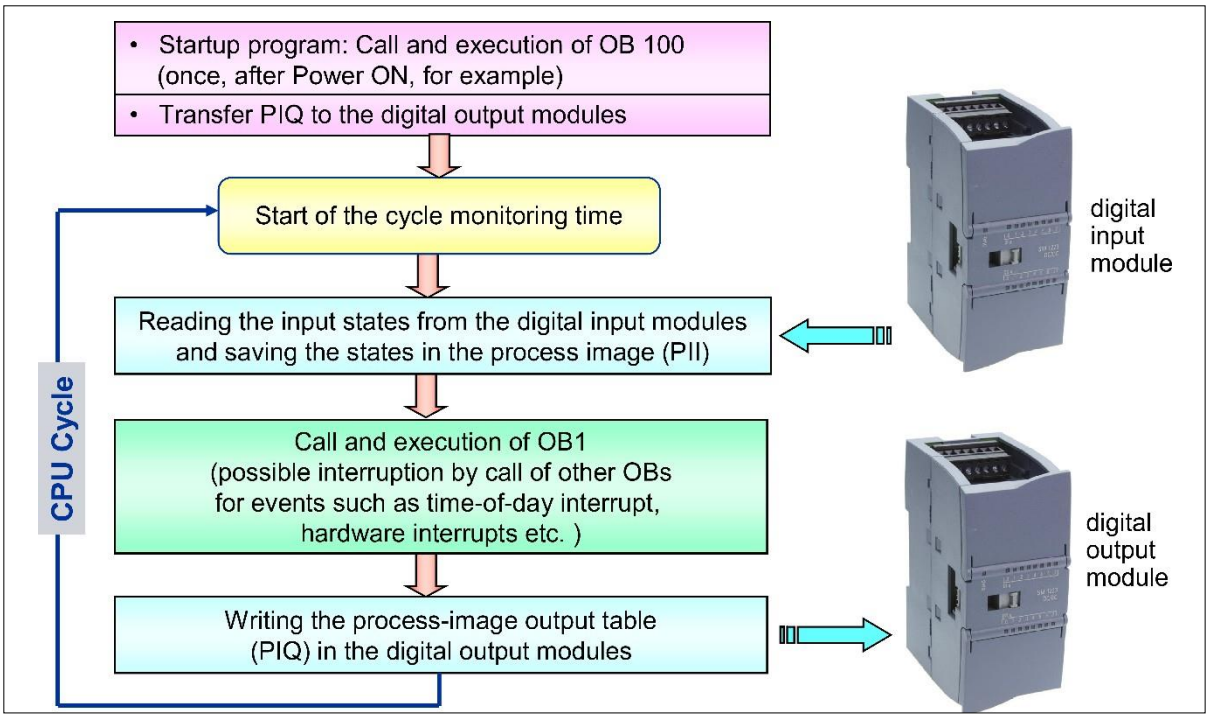
Cyclic Program Execution

Restart

When you switch on or switch from STOP --> RUN, the CPU carries out a complete restart (with OB100). During restart, the operating system deletes the non-retentive memory bits, timers and counters, deletes the Interrupt stack and the Block stack, resets all stored process interrupts and diagnostic interrupts and starts the cycle monitoring time.

Cyclic program execution

Cyclic program execution occurs in an endless loop. After the execution of a program cycle is completed, the execution of the next cycle occurs automatically. In every program cycle, the CPU carries out the following steps.



The CPU scans the states of the input signals and updates the process image inputs.

The CPU sequentially processes the instructions of the user program and so works directly with the process images, not with the inputs and outputs of the digital input / output modules.

The CPU transfers the output states from the process image outputs to the digital output modules.

Cycle and cycle monitoring time

The time that the CPU requires for the execution of a complete program cycle, is the cycle time which is monitored for time by the CPU operating system. If the cycle time exceeds the cycle monitoring time defined in the CPU properties by more than double, the CPU goes into the STOP state.