

Logix5000

Program Management

Source – Rockwell Publication 1756-PM006B-EN-P

Program Structure

The Logix Family of controllers is organized into:

- TASKS
- PROGRAMS
- ROUTINES

The Logix Family of controllers includes:

- ControlLogix
- CompactLogix
- FlexLogix
- DriveLogix
- SoftLogix5800

Program Structure

Tasks

A task is a scheduling mechanism for executing a program.

General Rules:

- A controller can only execute one task at a time.
- A different task can interrupt a task that is executing and take control.
- In any given task, only one program executes at one time.
- Tasks can be prioritized.

Program Structure

Tasks

3 Types

Continuous

- Runs continuously.
- Only one continuous task per project.
- Not required in a project.

Periodic

- Runs at a specific period.
- Interrupts lower priority tasks.
- Returns control to where the previous task left off.
- Configured between 0.1ms & 2000s.

Event

- Runs only when a specific event (trigger) occurs.
 - Interrupts lower priority events.
 - Executes one time.
- Event Triggers
- ✓ Change in digital input
 - ✓ New sample of analog data
 - ✓ Certain motion operations
 - ✓ Consumed tag
 - ✓ Event instruction

Program Structure

Tasks

Number of Tasks and Priority Levels by Controller Type

Controller	Max # of Task	Priority Levels
ControlLogix	32	15
SoftLogix5800	100	3
CompactLogix	8	15
FlexLogix	8	15
DriveLogix	8	15

- If you use too many tasks the continuous may take too long to complete.
- Other tasks may experience overlap. This happens when a task is interrupted too frequently or too long – it may not complete it's execution before it is triggered again!



Task Priorities

1 = Highest

15 = Lowest

Tasks with same priority alternate executing at 1ms intervals.

Program Structure

Programs

A program contains one or more routines where logic is executed.

General Rules:

- Up to 100 programs can belong to a Task.
- One routine must be assigned as the *main* routine.
- A *fault* routine can be assigned in the event the program faults.
- A program includes it's own tag database.
- A program can be inhibited or unscheduled

Program Structure

Routines

A sequence of logic that is executed as a block

General Rules:

- Number of routines limited only to available controller memory.
- Conforms to IEC 61131-3 programming standards.

Program Structure

Routines

4 Types

<p style="text-align: center;"><u>Ladder</u></p> <ul style="list-style-type: none">➤ Based on relay logic➤ Good for discrete control➤ Widely used in manufacturing plants	<p style="text-align: center;"><u>Function Block</u></p> <ul style="list-style-type: none">➤ Graphical programming➤ Good for process control➤ Widely used in process plants i.e. gas refinery
<p style="text-align: center;"><u>Sequential Function Chart</u></p> <ul style="list-style-type: none">➤ State engine approach➤ Good for sequential control of machinery➤ Easy to troubleshoot	<p style="text-align: center;"><u>Structured Text</u></p> <ul style="list-style-type: none">➤ Text-based programming➤ Hi-level programming➤ Becoming more popular

Controller Properties

Overhead Timeslice

Logix controllers communicate to other controllers or devices at either a specified rate (scheduled) or when there is processing time available (unscheduled).

Scheduled

- Updates I/O data
- Processes
Produce/Consumer tags

Unscheduled

- Programming terminals
- HMI devices
- MSG instructions
- Responds to MSG's from other controllers
- Synchronize secondary controller of a redundant system

Controller Properties

Overhead Timeslice

The overhead system timeslice specifies the percentage of time that the controller devotes to unscheduled communications.

- Executes for up to 1ms at a time and then resumes the continuous task.

Controller Properties

Producer / Consumer Tags

Produced tags are used to share data with other controllers quickly and without additional programming.

Consumed tags are used to receive data from other controllers quickly and without additional programming.

- Produced and consumed tags must be controller scoped.
- Produced tags are 'broadcast' on the network – one to many.
- Consumed tags 'wait and listen' for other controllers to broadcast their produced tags.
- Produced tags are included in the scheduled communications.

Advantages

- One to many relationship
- No additional programming
- Scheduled communication

Disadvantages

- Increased network traffic
- Multi-cast packet on Ethernet
- Needs managing