



Write a self-contained function block in 61131-3 structured text that implements a timer.



The IEC 61131-3 standard is used to create industrial automation software, and structured text is one of its programming languages. Here's a simple timer function block written in 61131-3 structured text:

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```
FUNCTION_BLOCK Timer
VAR_INPUT
    Start: BOOL; // Start the timer
    Reset: BOOL; // Reset the timer
    PresetTime: TIME; // The time to count
END_VAR

VAR_OUTPUT
    ElapsedTime: TIME; // Time elapsed since the timer started
    Done: BOOL; // Indicates if the timer has completed
END_VAR

VAR
    StartTime: TIME;
    Running: BOOL;
END_VAR

METHOD RunTimer: BOOL
    Running := Start AND NOT Done;
    RETURN Running;
END_METHOD

METHOD ResetTimer: BOOL
    StartTime := 0;
    ElapsedTime := 0;
    Done := FALSE;
    RETURN Reset;
END_METHOD

METHOD UpdateElapsedTime: BOOL
    ElapsedTime := TIME() - StartTime;
    RETURN ElapsedTime >= PresetTime;
END_METHOD

METHOD SetDone: BOOL
    Done := TRUE;
    RETURN Done;
END_METHOD
END_FUNCTION_BLOCK
```

To use the timer, create an instance of the Timer function block, and call its methods in your main program. Here's an example of how to do that:

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```
PROGRAM Main
VAR
    myTimer: Timer;
    startSignal: BOOL := FALSE;
    resetSignal: BOOL := FALSE;
END_VAR

IF startSignal THEN
    myTimer.Start := TRUE;
    myTimer.Reset := FALSE;
ELSIF resetSignal THEN
    myTimer.Start := FALSE;
    myTimer.Reset := TRUE;
ELSE
    myTimer.Start := FALSE;
    myTimer.Reset := FALSE;
END_IF

IF myTimer.RunTimer() THEN
    IF NOT myTimer.Running THEN
        myTimer.StartTime := TIME();
    END_IF;

    IF myTimer.UpdateElapsedTime() THEN
        myTimer.SetDone();
    END_IF;
ELSIF myTimer.ResetTimer() THEN
    // Timer has been reset
END_IF;
END_PROGRAM
```

The main program starts or resets the timer based on the `startSignal` and `resetSignal` boolean variables, which can be controlled by external inputs or other logic within your program.