PLC, DSP, DSC, FPGA

What they are good for
Programmable Logic Controller
PLC

Most of them can control processes at $10^{-2}\text{s}$ or slower.

Do NOT use it to control current in a system like this:

$L = 1\text{mH}$

$U = 100\text{V}$

$\Delta I = 0.1\text{A}$

$\Delta t = 10^{-6}\text{s}$
Digital Signal Controller DSC
Digital Signal Processor DSP

Difference:
DSC -> same idea as microcontroller, all the necessary things in one chip.
DSP -> uses external RAM and ROM and requires address and data busses to access them.

Most of them can control processes at $10^{-5}s$ or slower.

One can use it to control current in a system like this:

$$\Delta I = 0.1A$$
$$\Delta t = 10^{-5}s$$

$L = 1\text{mH}$
$U = 10\text{V}$
Field Programmable Gate Array
FPGA

What if $\Delta I$ have to be less than 0.01A?

Most of them can control processes at $10^{-7}s$ or slower.

One can use it to control current in a system like this:
Many solutions in one system

Field bus (e.g. Prifibus)

PLC

DSP/DSC

FPGA

Process with highly different time constants

Slow process

Fast process

Very fast process

control

feedback

reference

errors

control

feedback

reference

errors

control

feedback

reference

errors

feedback from slower part

feedback from faster part

control
Exercise 2 (solution)

MOTOR.QLS

1    " Printout of file f:motor.q3  From 3. 3. 8"
2
3    00000 BLOCK_1   "
4    001     L I 0.1
5    002     AN Q 0.2
6    003     A I 0.0
7    004     S Q 0.1
8    005     L I 0.2
9    006     AN Q 0.1
10   007     A I 0.0
11   008     S Q 0.2
12   009     LN I 0.0
13   010     R Q 0.1
14   011     R Q 0.2
15   012     EP
Exercise 3 (slightly modified exercise 2)

You’ve got:
2 relays with 3-f main contacts and WITHOUT auxiliary contacts
2 push button switches NO (green ones)
1 push button switch NC (red one)
1 induction motor

Your goal in Ex.2 was to operate drive in two directions safely (without a risk of short circuiting the mains).

Now your goal is to prevent the system from immediate switching ON action after an OFF switching action. Let us assume that the drive needs 5 secs to stop. It means that the green buttons should be inactive during this period of time. This inactivity should be permanent, i.e. no action at all in the system if someone presses green buttons during this period of time. Write an appropriate code for a PLC from previous slide.

Let the competition continue!