**What’s new?**

Project 3 has 5 distinctive features compared with Project 2, the new features will be listed as following:

1. Simulator

In the project 3, the simulator is updated with new structure.

Memory addresses from 0 to 9 is reserved.

Memory addresses from 10 to 50 are used to store the Boot Program which will be executed after pressing Power On button.

Memory addresses beginning from 55 are available for the User Programs.

When the button *Power On* is pressed, the Boot Program will be executed, the Boot Program will read the contents from Device (DevId:31) and copies them into the Memory starting with address 55. When the Boot Program finishes its duty, it will jump to the Memory address 55 and execute the copied User Program.

1. User Programs

When the Boot Program is executed which aims to copying the User Program to the Memory, the Device (DevId:31) will pause and wait user to determine the contents need to copy. The User Program has three different choices:

1. Editor: programmer can write instructions.
2. Program1: this is the program1 that the Project2 was required, program1 use the instructions we have written previously.
3. Program2: this is the program 2 that Part3 requires, program2 read 6 sentences from a file into memory and then print the sentences on the Printer (DevId:1).

(3)Console

The Console section can display the Simulator logs. The Simulator logs can be classified into five categories, each type can be shown in a different color.

1. Log: general information of system, such as Power On information.
2. Error: exceptions thrown by Simulator or CPU.
3. Circle: cycle information when the instruction is executed.
4. Instruction: instruction information when the CPU is executing instructions.
5. Wait: information thrown when the CPU is blocked and waiting I/O devices to awake.

(4) Keyboard Improvement

A new function is added, the virtual keyboard in the Project can connect with the real keyboard of computer.

(5) New device: File Device

We design another type of device: File device that can be used to configure to another file.

File device can be divided into two categories:

1. File input device (Devid: 3): used as an input device.
2. File output device (Devid: 4): used as a output device.

(6) Register

The user interface of the register is changed to easier use, the information can be exhibited at one time.