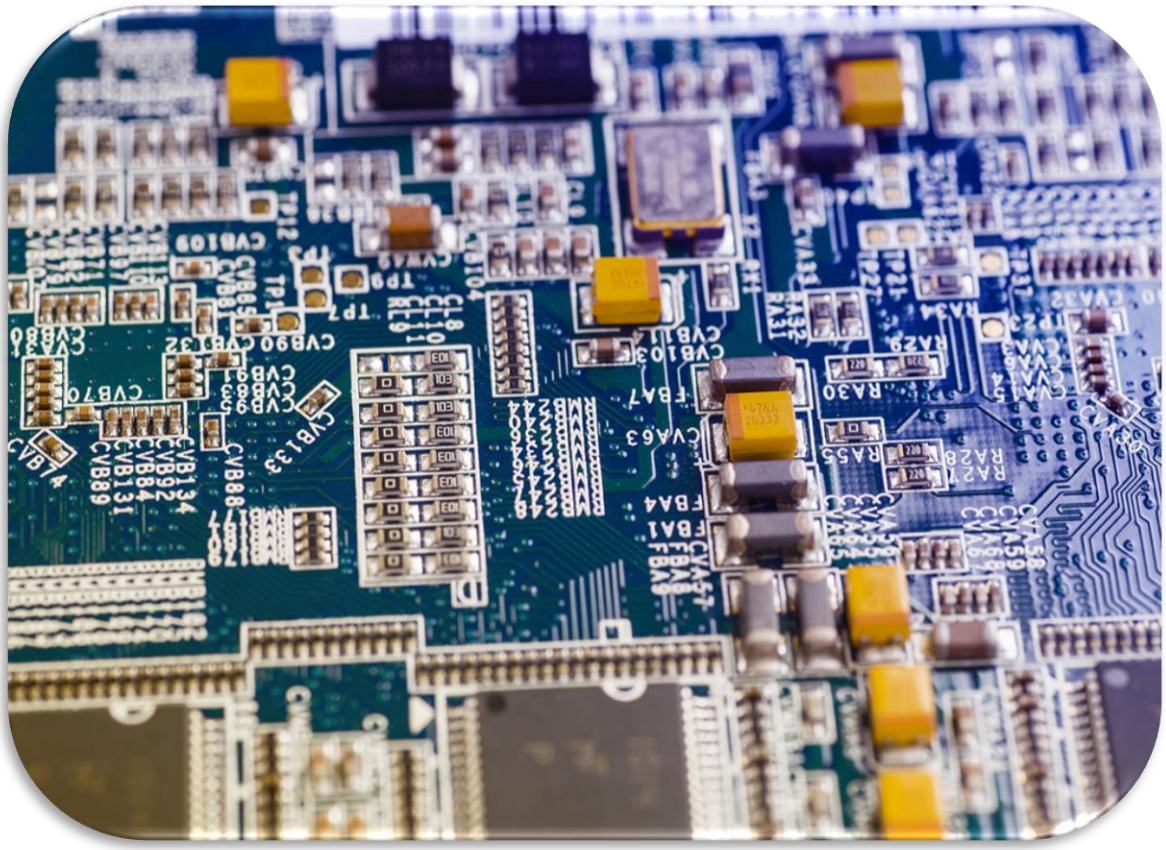

Laboratory activities

LAB NUMBER ONE
GROUP NUMBER FIVE

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Linnaeus University

My experiment

The lab activities could help me understand many concepts within the Assembly program language and I understand the importance of using Microcontrollers in our daily life.

The Microcontroller that I have focused to work on is STK600 with CPU ATmega2560. In all the lab sessions I have learned cool tips from TA and I did my best to understand all the concepts.

To be able to run an assembly program we should know what hardware we are going to use and depending on our hardware or our Microcontroller we have to choose an appropriate development environment to work with which is AVR 4 as an example.

How to get started briefly?

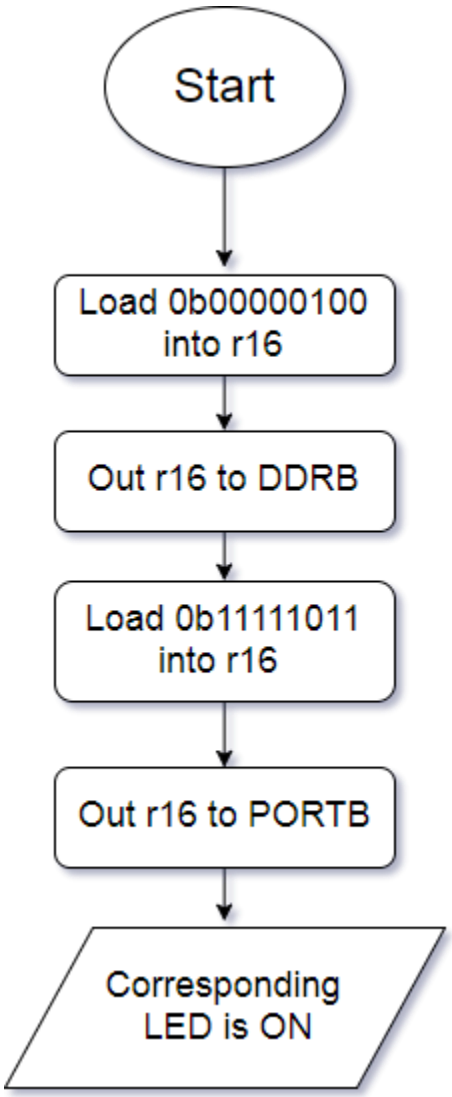
Install AVR 4 and choose your proper hardware from the list in the application, connect your hardware to your computer with USB to program the hardware. We can run the program on hardware or we can use simulator if we don't have the hardware (Like we did in task 4).

Let's get started!

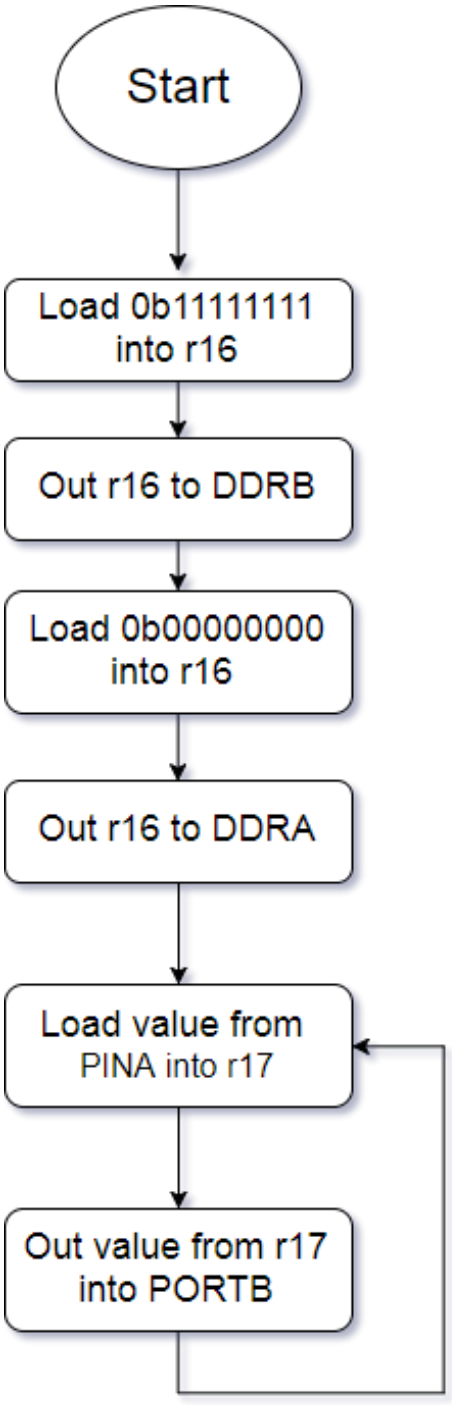
By opening the ASM files you can find comment in front of each line which can describe everything. Here I will focus on "Flow Charts".

By comparing the code, comments and flow charts, it can be clearer to understand how each task is working.

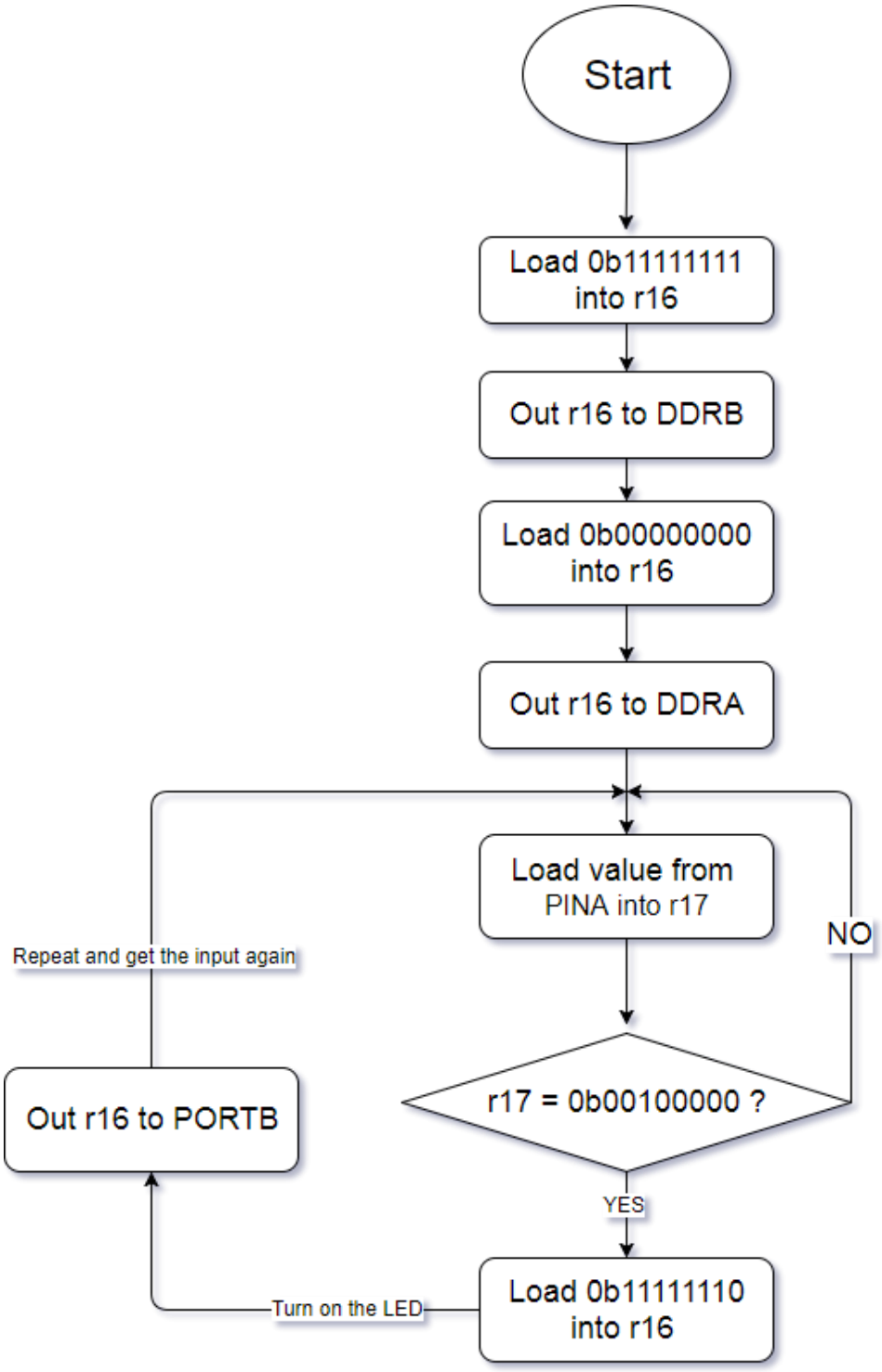
Task 1:



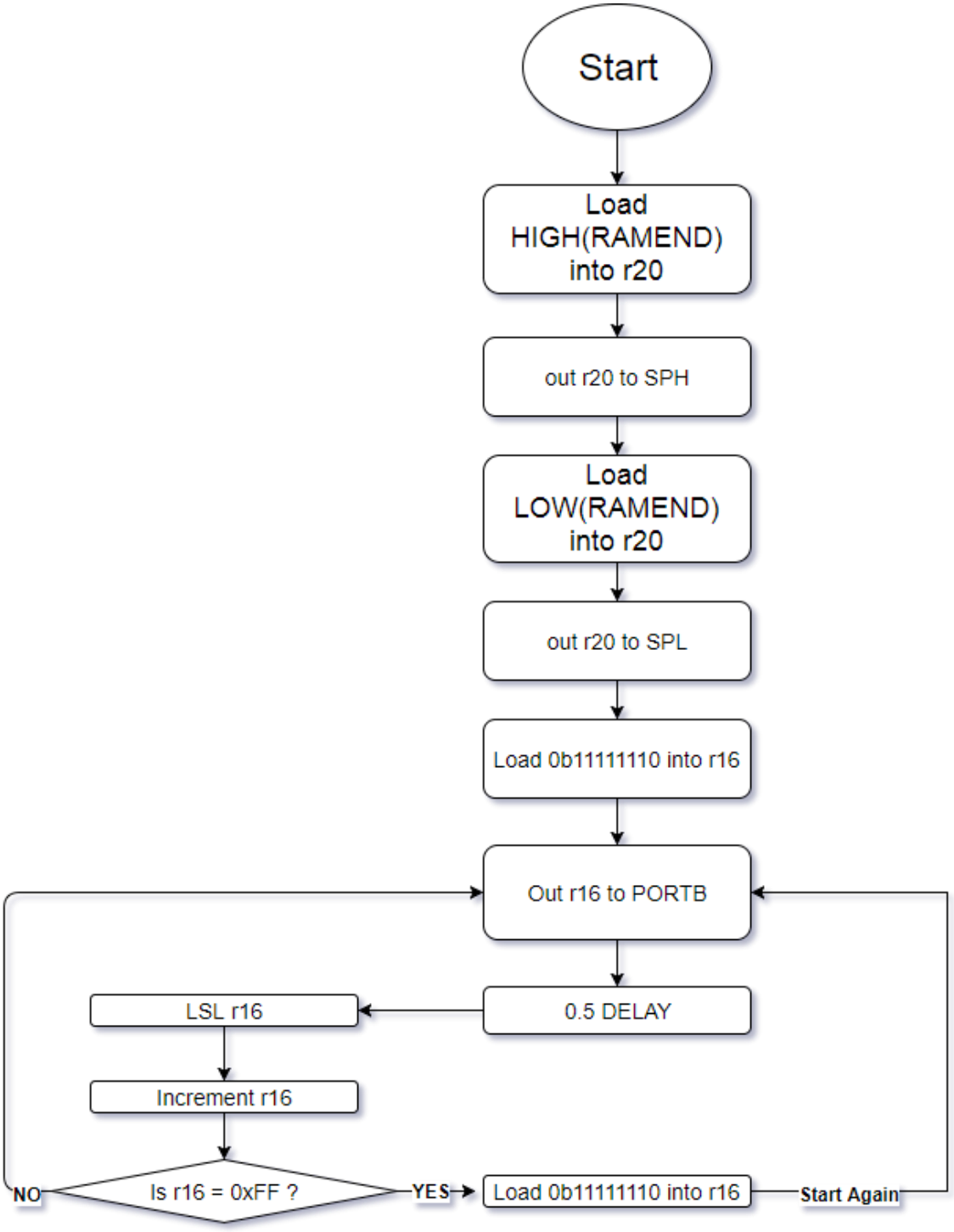
Task 2:


Start
Load 0b11111111 into r16
Out r16 to DDRB
Load 0b00000000 into r16
Out r16 to DDRA
Load value from PINA into r17
Out value from r17 into PORTB

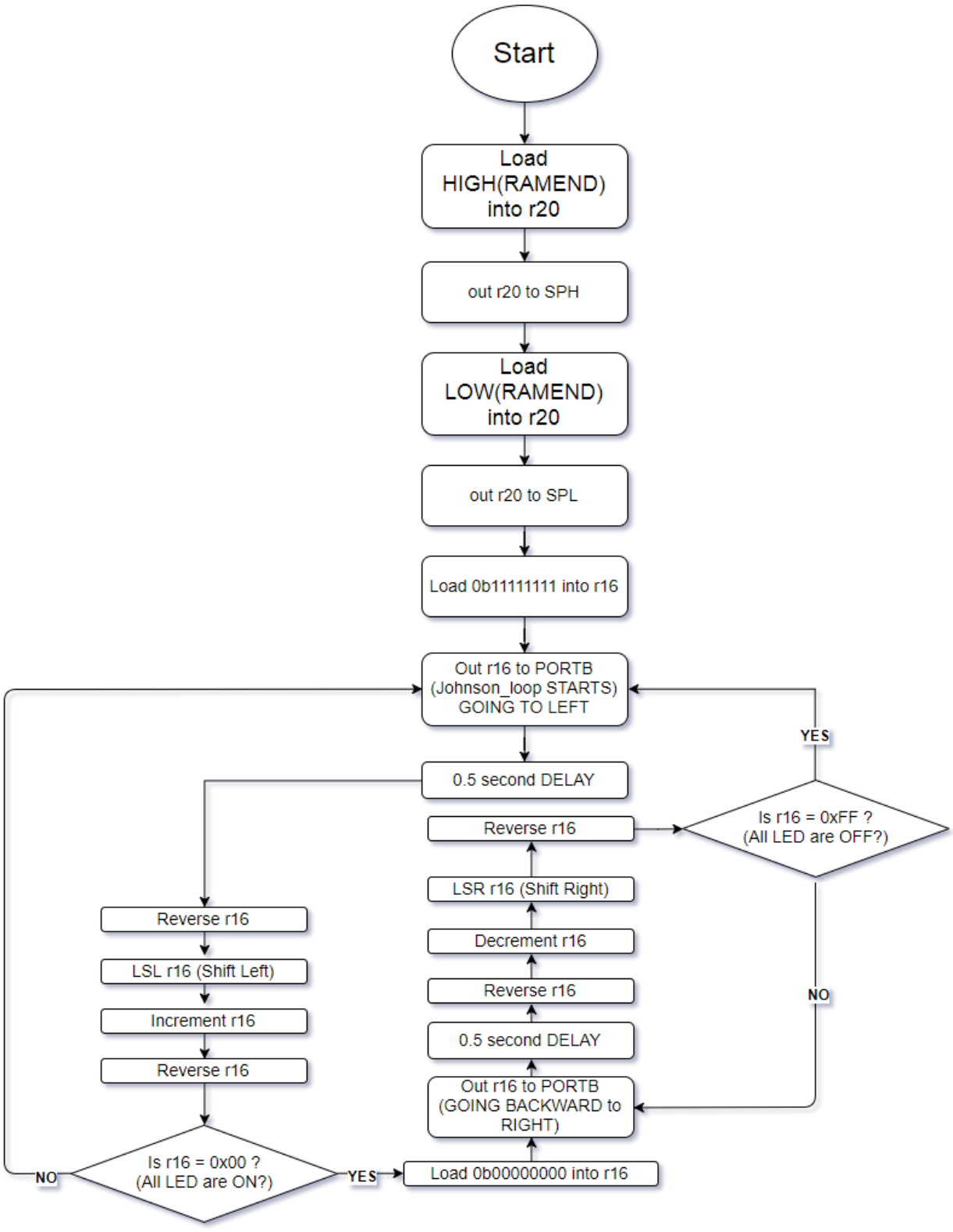
Task 3:


Start
Load 0b11111111 into r16
Out r16 to DDRB
Load 0b00000000 into r16
Out r16 to DDRA
Load value from PINA into r17
r17 = 0b00100000 ?
NO
YES
Load 0b11111110 into r16
Turn on the LED
Out r16 to PORTB
Repeat and get the input again

Task 5:


Start
Load HIGH(RAMEND) into r20
out r20 to SPH
Load LOW(RAMEND) into r20
out r20 to SPL
Load 0b11111110 into r16
Out r16 to PORTB
0.5 DELAY
LSL r16
Increment r16
Is r16 = 0xFF ?
NO
YES
Load 0b11111110 into r16
Start Again

Task 6:


Start
Load HIGH(RAMEND) into r20
out r20 to SPH
Load LOW(RAMEND) into r20
out r20 to SPL
Load 0b11111111 into r16
Out r16 to PORTB (Johnson_loop STARTS) GOING TO LEFT
0.5 second DELAY
Reverse r16
LSL r16 (Shift Left)
Increment r16
Reverse r16
Is r16 = 0x00 ? (All LED are ON?)
NO
YES
Load 0b00000000 into r16
Out r16 to PORTB (GOING BACKWARD to RIGHT)
0.5 second DELAY
Reverse r16
Decrement r16
LSR r16 (Shift Right)
Reverse r16
Is r16 = 0xFF ? (All LED are OFF?)
YES
NO