1. Below shows that successful compilation window for the **light** project. Instead of **Nios_system.v**, the Qsys file is named **unsaved.v** in this project.

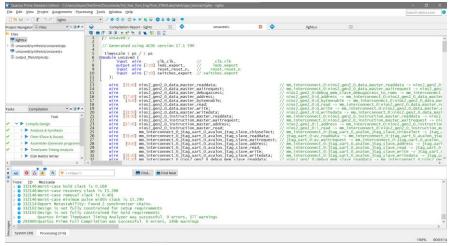


Figure 1: unsave.v

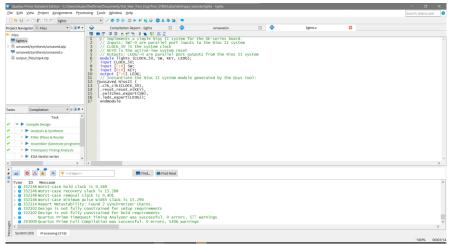


Figure 2: lights.v

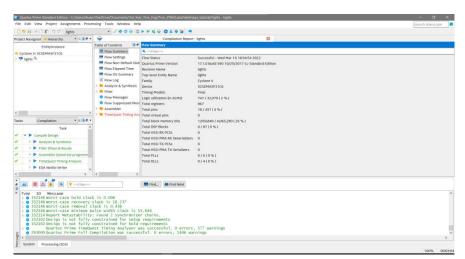


Figure 3: Successful Compilation Window

2.

```
    Nios II - blinky/hello_world.c - Eclipse

    File Edit Source Refactor Navigate Search Project Run Nios II Window Help
 Quick Access 🖺 🙋 Nios II
    De Project Explorer M

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So
                                                                                                      ☐ tello_worldc El

2 * "Hello World" example.

16 #include "system.h"

17 #include «stdio.h>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Project Explorer ≅
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       system.h
stdio.h
main():int
                                                                                                                                                                                                                                   le int main()
20 {
21 printf("Hello from Steven and A
22 char * LEDs=(char *) LEDS_BASE;
24
                                                                                                                                                                                                                                                             printf("Hello from Steven and Arun, Group 1 MECHATRON 3TB4 2019!\n");
                                                                                                                                                                                                                                         24 while(1){
26 *LEDS=0xFF;
27 usleep(1000*1000);
28 *LEDS=0x00;
29 usleep(1000*1000);
30 }
          e create-this-app
Makefile
readme.txt

bilinky_bsp [unsaved]
                                                                                                                                                                                                                                   32 return 0;
33 }
                                                                                                                                                                                                                                     Problems - Tasks Console M Nios II Console S Properties
STB4_Lab4_Confg.-cable DE-Sec on localbust [USB-1] device TD: 2 restance ID: 0 name; Impurt_0
Hello from Steven and Arun, Group 1 MECHATRON STB4 2019:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ■ ₽ № ▼ □ □
 blinky
```

Figure 4: Program Overview

```
  hello_world.c 

  □

 2⊕ * "Hello World" example.
 16 #include "system.h"
17 #include <stdio.h>
190 int main()
20 {
21 printf("Hello from Steven and Arun, Group 1 MECHATRON 3TB4 2019!\n");
22
23
24
25
      char * LEDs=(char *)LEDS BASE;
      while(1){
26
27
       *LEDs=0xFF;
         usleep(1000*1000);
 28
          *LEDs=0x00;
          usleep(1000*1000);
 30
 31
 32
      return 0;
33 }
34
                                                                                                 3TB4_Lab4_Config - cable: DE-SoC on localhost [USB-1] device ID: 2 instance ID: 0 name: jtaguart_0
Hello from Steven and Arun, Group 1 MECHATRON 3TB4 2019!
```

Figure 5: Output Zoomed In

3. Below is the behavior of all the signals **KEYO** is pressed and not pressed. The difference is caused because pressing **KEYO** resets the NiosII blinking program, where the clock signal is cut off and no triggering happens.

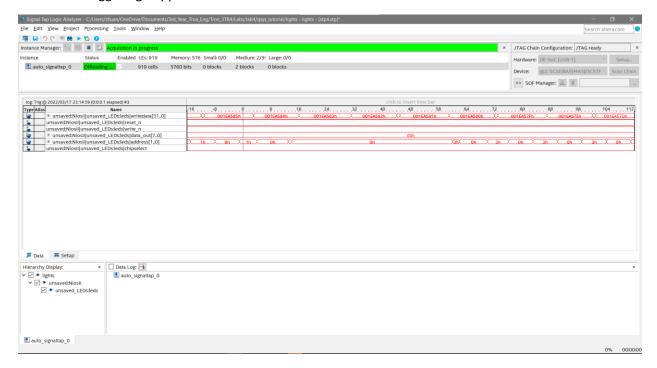


Figure 6: When KEYO not pressed, data_out stays at 00h and writedata toggles with the clock toggling

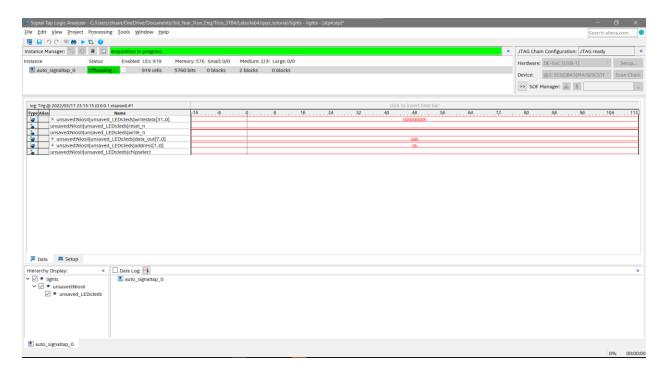


Figure 7: When KEYO pressed, data_out stays at 00h and writedata stays at 00000000h

Questions:

1. The chip processor is the master, as it starts and end all processes. When the processor stops, all other programs are forced stop as well.

Lab #4 Pre-lab

- 2. the following:
 - Quartus acts as the hardware/software
 - Qsys acts as the hardware
 - Nios Eclipse acts as a **software**
 - signal analyzer acts as a software/hardware