

TP1

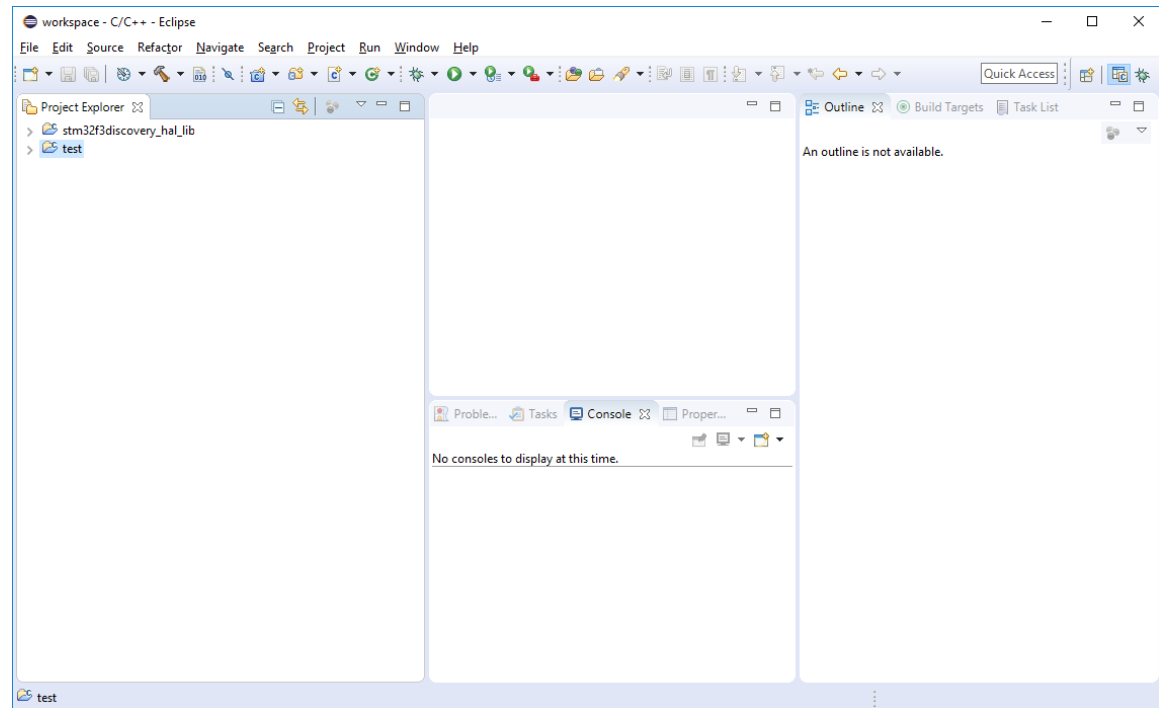
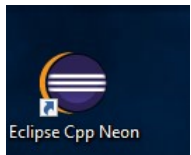
bosio@lirmm.fr

PC configuration

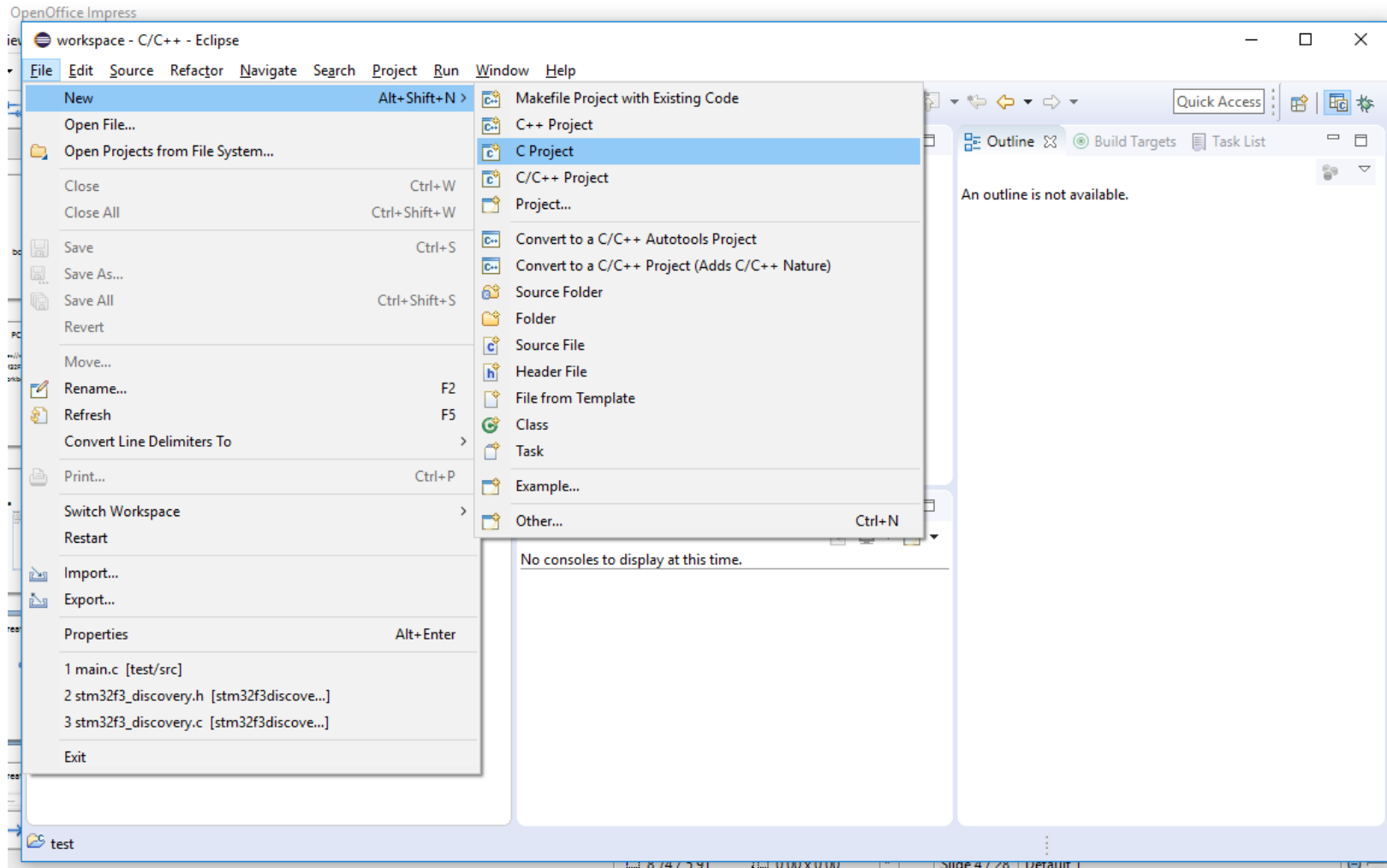
- Eclipse
<https://www.eclipse.org/home/index.php>
- Board STM32F3 Discovery
- System workbench
(www.openstm32.org)

Eclipse

- Run eclipse



Create a new project



Create a new project

C Project
Create C project of selected type

Project name:

☒ Use default location
Location:

Choose file system:

Project type:

- > GNU Autotools
- ▼ Executable
 - Empty Project
 - Hello World ANSI C Project
 - **Ac6 STM32 MCU Project**
- > Shared Library
- > Static Library
- > Makefile project

Toolchains:

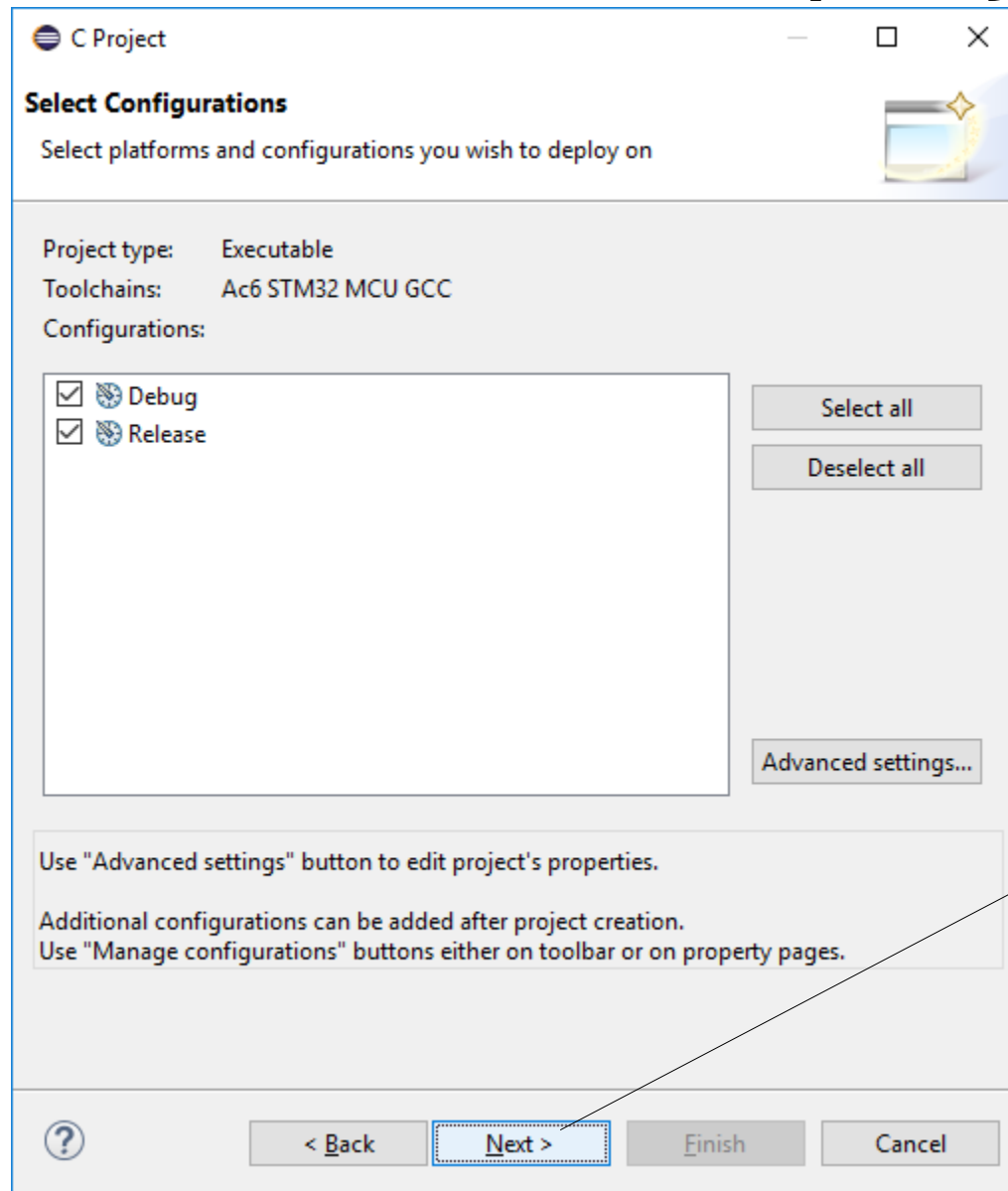
- Ac6 STM32 MCU GCC**

☒ Show project types and toolchains only if they are supported on the platform

Type the
name of your
project

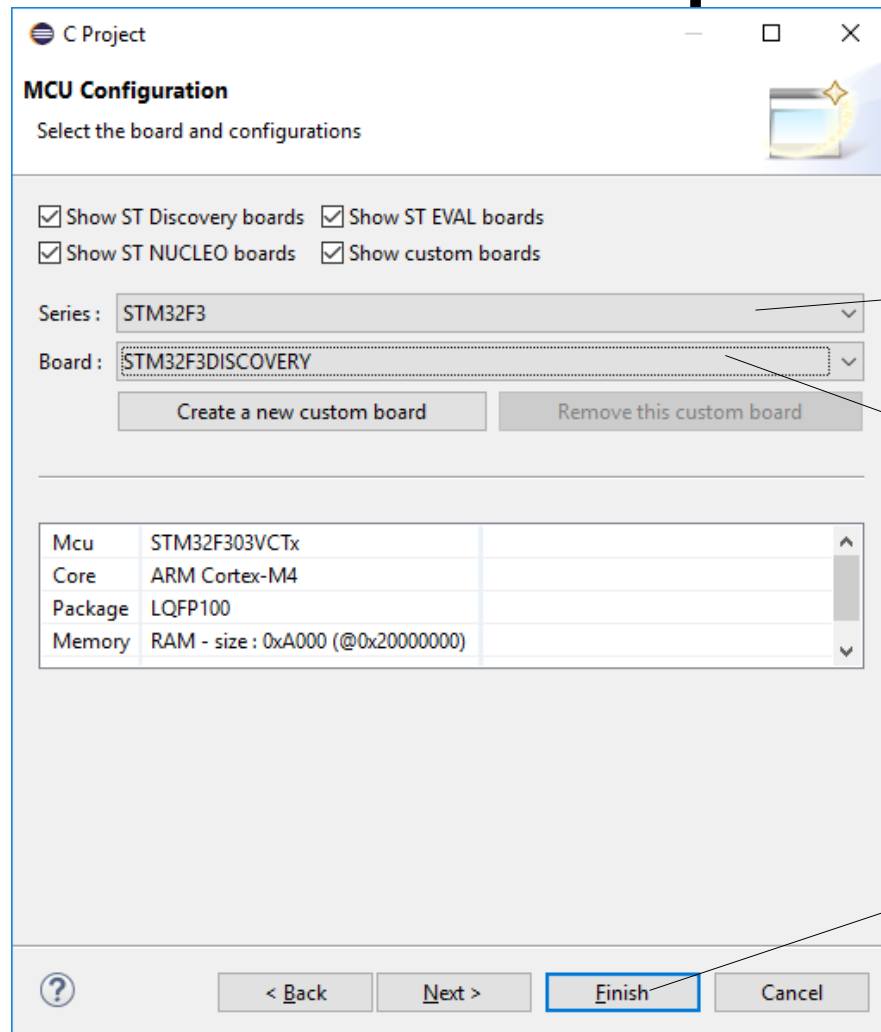
Select the AC6
options

Create a new project



Click on next

Create a new project: select the development board

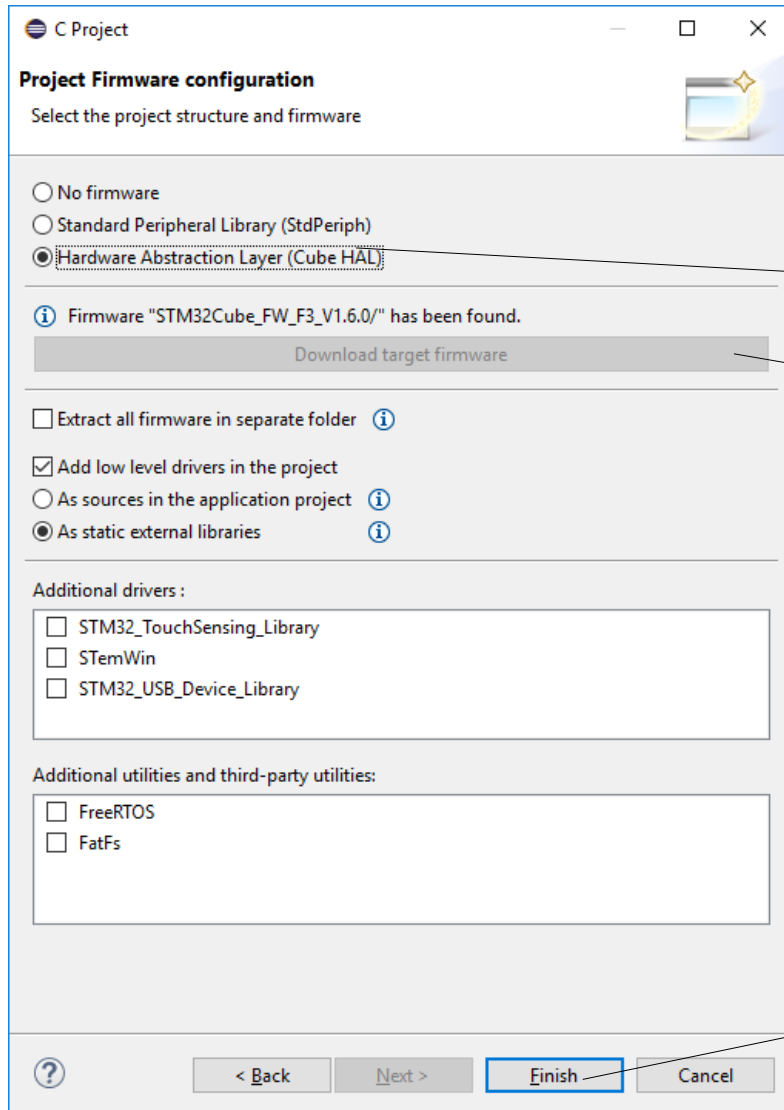


STM32F3

STM32F3DISCOVERY

Click on finish

Download the Firmware



Cube hal

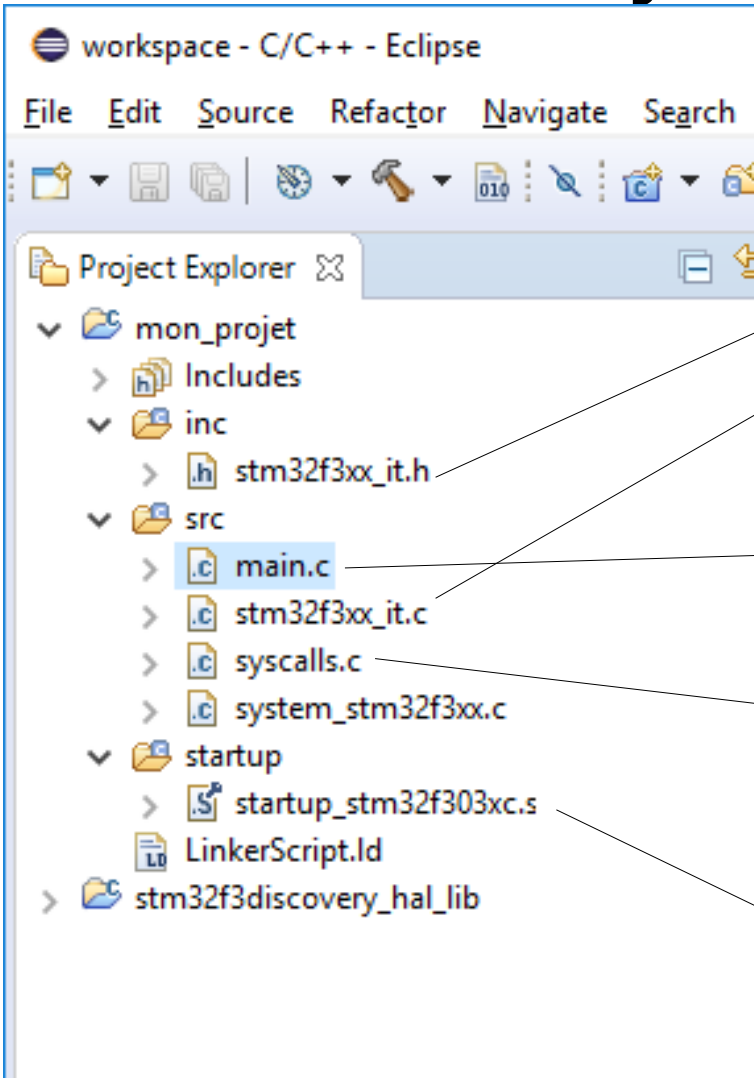
Download the firmware
(required only the first
time)

Click on finish

Project Structure

- Your project is composed of several files
- Let's have a look...

Project Structure



Interrupt definition header and c file

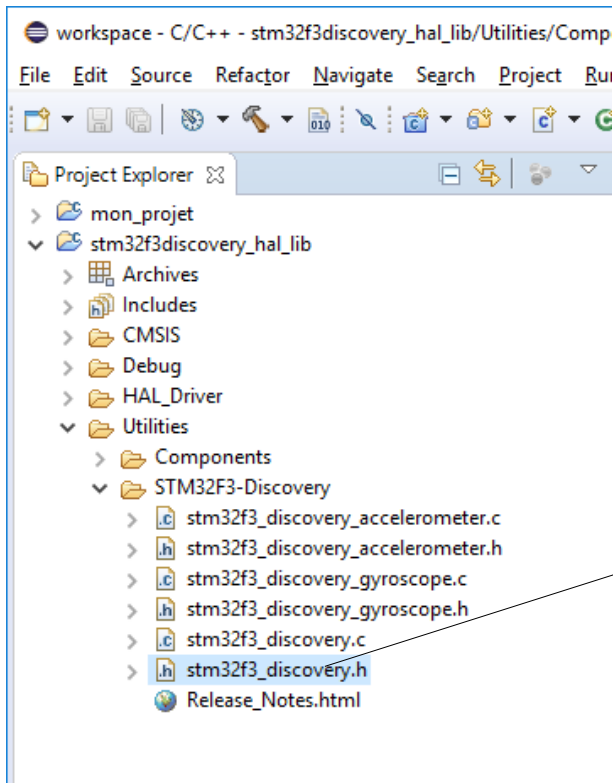
Main with your code

System calls (redefinition of stdio.h calls)

Assembly startup file, the very first code executed by MCU and interrupt prototypes

HAL Library

- HAL Driver: developed by ST, deliver high level function to access peripherals (one file each periph.)



Some usefull functions, we will use in the first Labs

First Project

- Download the file
 - www.lirmm.fr/~bosio/L3/lab1.c
- Open the lab1.c with a text editor and copy the code into the main.c of your eclipse project

Look at the code

```
18 int find_maximum(char* , int);
19
20 int main() {
21     int size, location, maximum; //Int variables (32 bit)
22     //Array of Unsigned 8 bit
23     char array[] = {3, 6, 3, 7, 12, 15, 1, 8, 256, 2, 763, 85};
24
25     //Compute size of the array
26     size = sizeof(array)/sizeof(array[0]);
27     location = find_maximum(array, size-1);
28     maximum = array[location];
29
30     BSP_LED_Init(LED4);
31     BSP_LED_On(LED4);
32
33     while(1);
34 }
35
36 int find_maximum(char *a, int n) {
37     int c, max, index;
38     max = a[0];
39     index = 0;
40
41     for (c = 1; c < n; c++) {
42         if (a[c] > max) {
43             index = c;
44             max = a[c];
45         }
46     }
47 }
```

Function
prototypes

Local
Variables

Switch on LED4 on board
(where the function is
defined? Look into
stm32f3_discovery.h and
stm32f3_discovery.c)

Never exit
from main

Look at the code

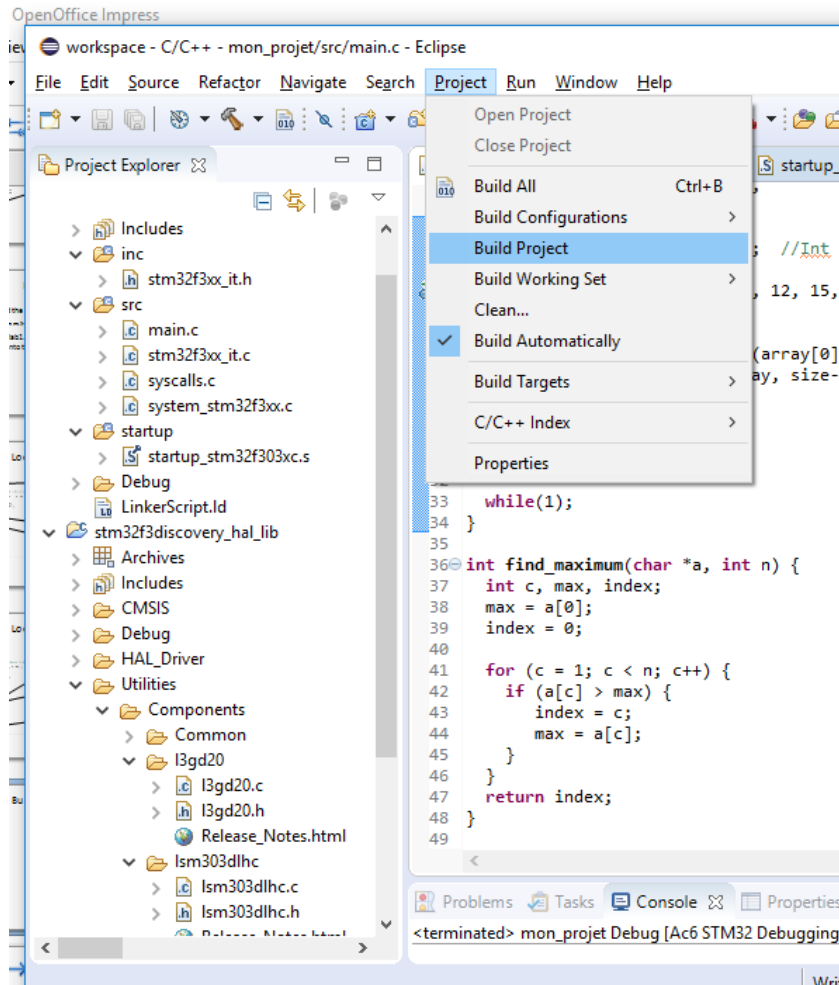
```
20 int main() {
21     int size, location, maximum; //Int variables (32 bit)
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23     char array[] = {3, 6, 3, 7, 12, 15, 1, 8, 256, 2, 763, 85};
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30     BSP_LED_Init(LED4);
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34 }
35
36 int find_maximum(char *a, int n) {
37     int c, max, index;
38     max = a[0];
39     index = 0;
40
41     for (c = 1; c < n; c++) {
42         if (a[c] > max) {
43             index = c;
44             max = a[c];
45         }
46     }
47     return index;
48 }
49
```

Function parameters

Local variables

Return result

Build the project



Build Result

workspace - C/C++ - mon_proj/src/main.c - Eclipse

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer

- mon_proj
 - Binaries
 - Includes
 - inc
 - stm32f3xx_it.h
 - src
 - main.c
 - stm32f3xx_it.c
 - syscalls.c
 - system_stm32f3xx.c
 - startup
 - startup_stm32f303xc.s
 - Debug
 - LinkerScript.ld
- stm32f3discovery_hal_lib
 - Archives
 - Includes
 - CMSIS
 - Debug
 - HAL_Driver
 - Utilities
 - Components
 - STM32F3-Discovery
 - stm32f3_discovery_accelerometer
 - stm32f3_discovery_accelerometer
 - stm32f3_discovery_gyroscope
 - stm32f3_discovery_gyroscope
 - stm32f3_discovery.c

```
19
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```

Problems Tasks Console Properties

CDT Build Console [mon_proj]

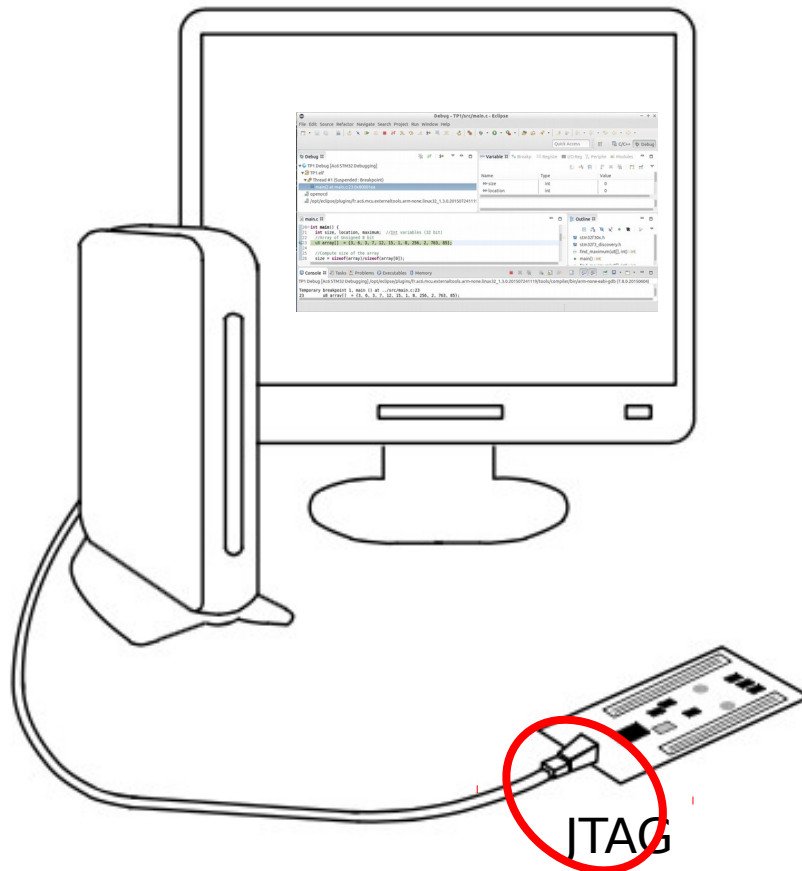
```
make --no-print-directory post-build
'Generating binary and Printing size information:'
arm-none-eabi-objcopy -O binary "mon_proj.elf" "mon_proj.bin"
arm-none-eabi-size "mon_proj.elf"
    text    data    bss     dec     hex filename
    2516    1124    1568    5208    1458 mon_proj.elf
```

17:37:56 Build Finished (took 3s.554ms)

This is the executable

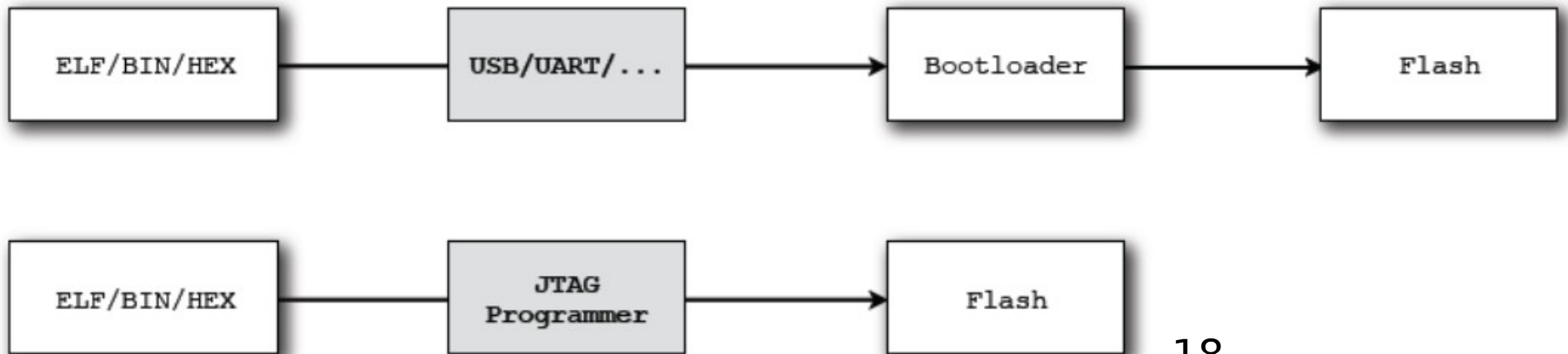
Execute your code

- **We have to send the binary code to the board**



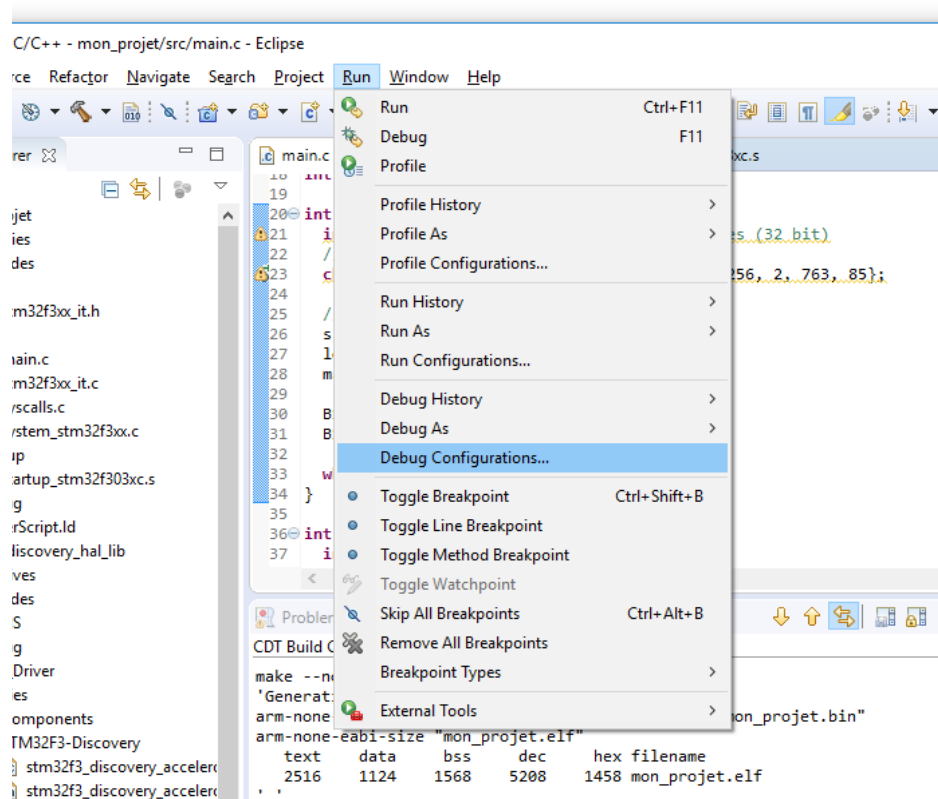
JTAG for programming

- To program a device we have two alternatives:
 - Using a USB / UART / ... connection in bootloader mode
 - **Using JTAG and programmer to**

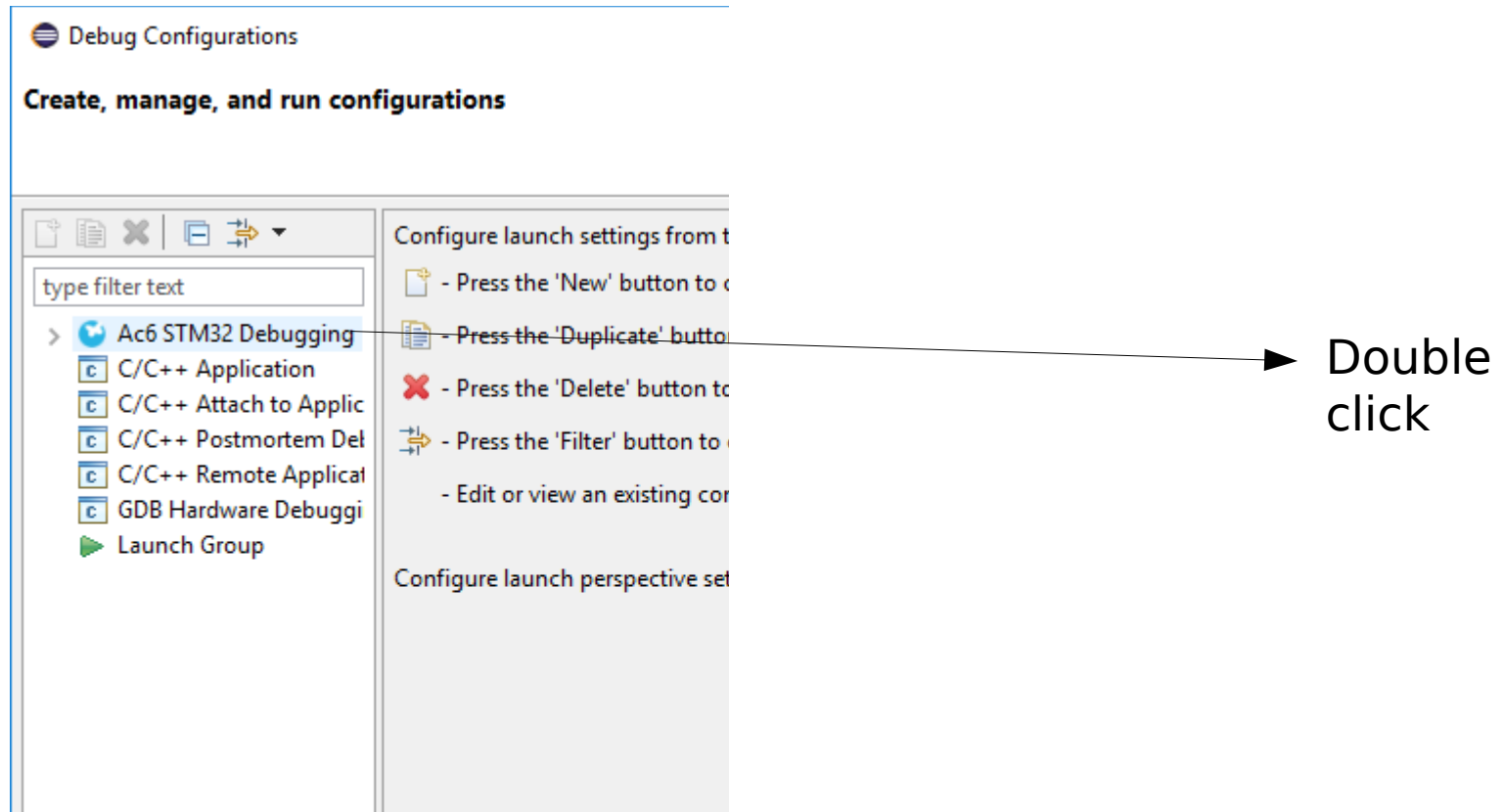


JTAG for programming

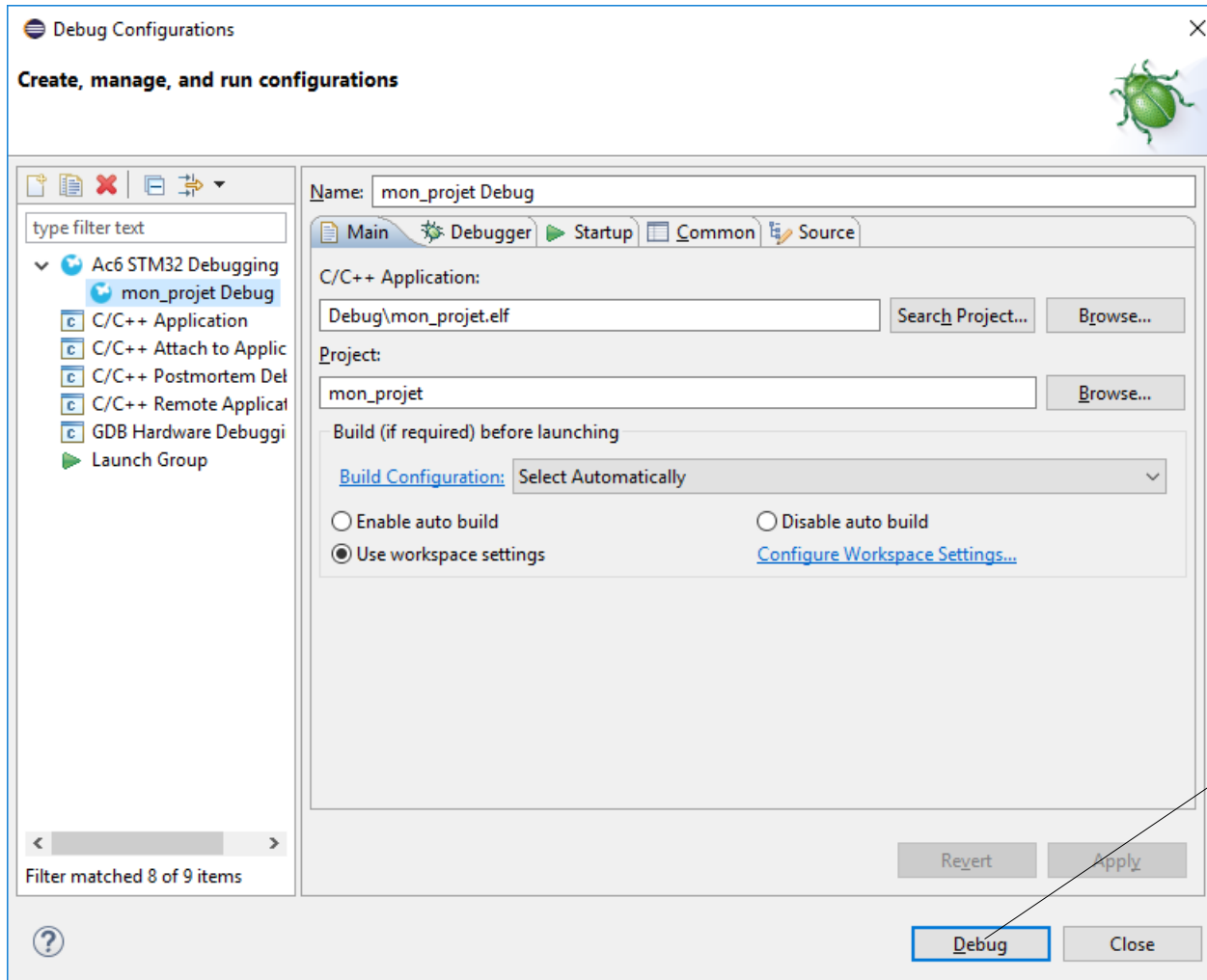
- To use JTAG we have to pass through the DEBUGGER
 - It use OpenOCD (<http://openocd.org/>)



Debug your code

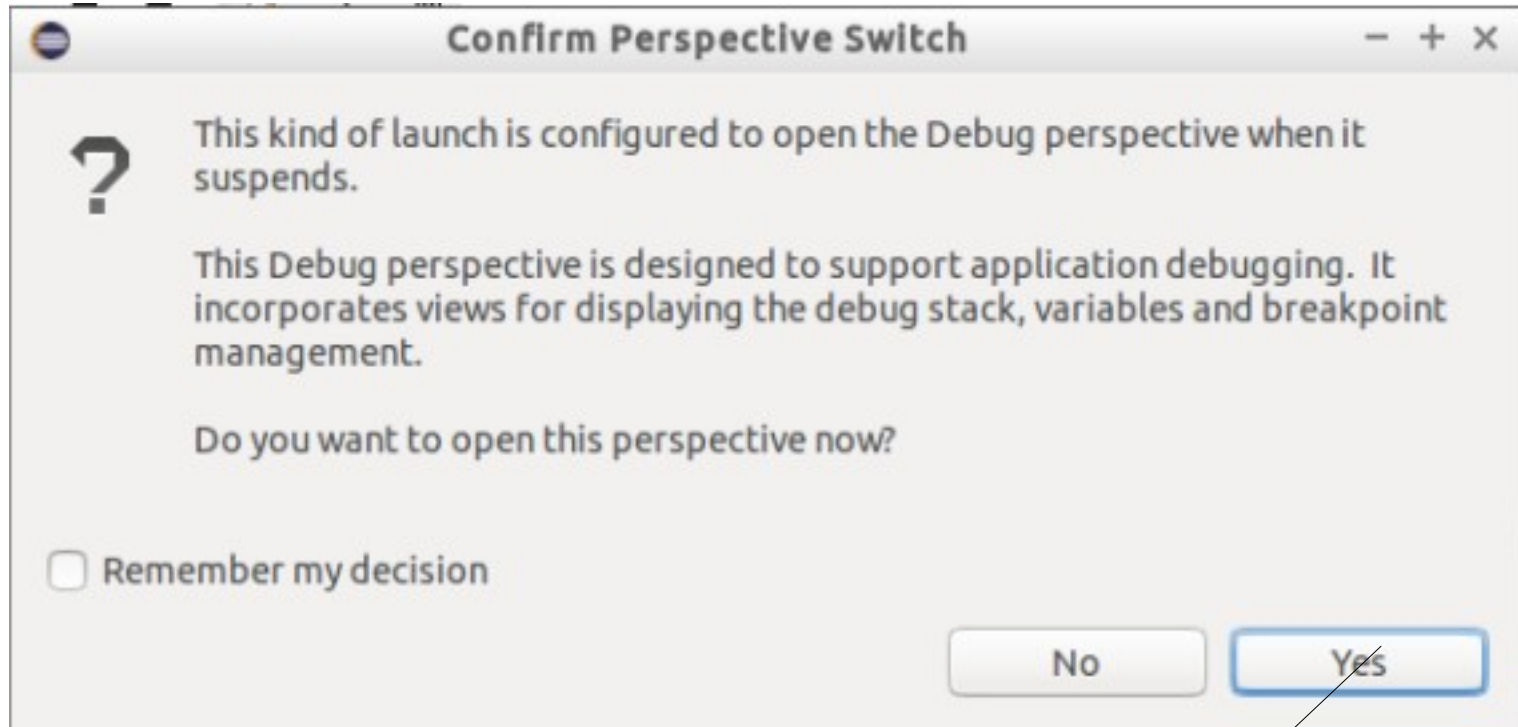


Debug your code



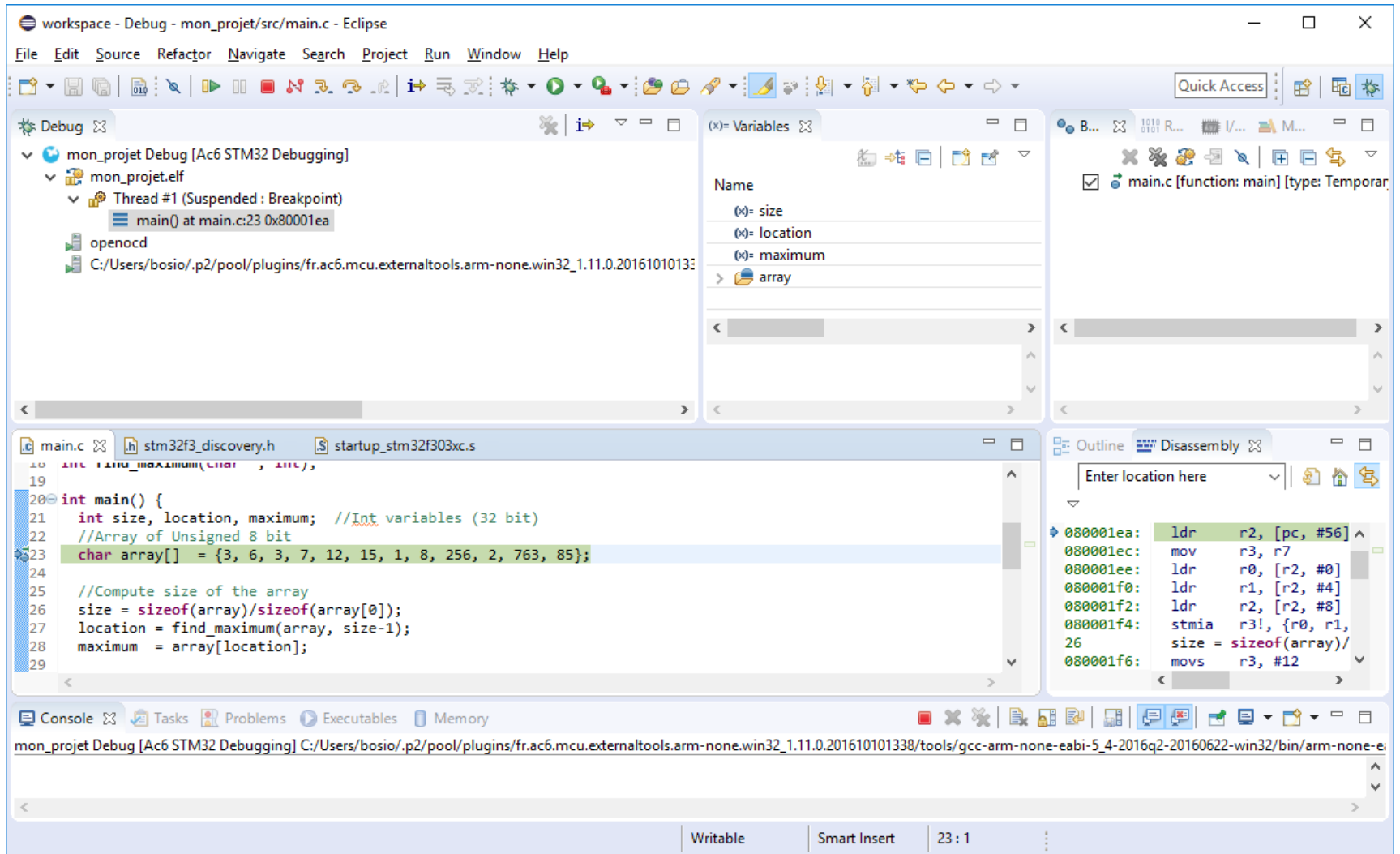
You can start to
debug

Debug your code



You activate the debug mode of
eclipse

The debug view



Debug yourself

- Try to debug code on the board
- Monitor variables
- Check debug steps buttons
- Is everything working correctly?
- Do the functions works properly?
- Are the results correct?
 - If not why?

Exercise

- Un palindrome est un mot qui reste le même qu'on le lise de gauche à droite ou de droite à gauche (par exemple, PIERRE n'est pas un palindrome, alors que OTTO est un palindrome).
 - Ecrire un programme qui vérifie si une chaîne simple (sans espace) est un palindrome: si oui allumer le LED4, sinon le LED7
 - La chaîne est constante (comme pour l'exemple précédente)