Embedded systems
Exercise session 7
Preparation of Lab 2

Lab 2: PIC programming

Goals:

- Building a simple embedded electronic circuit.
- Programming a PIC microcontroller.
- Experimenting with interrupts.

Programming environment:

- Assembly langage.
- Simple tools extracted from MPLAB X.

Installing the development tools

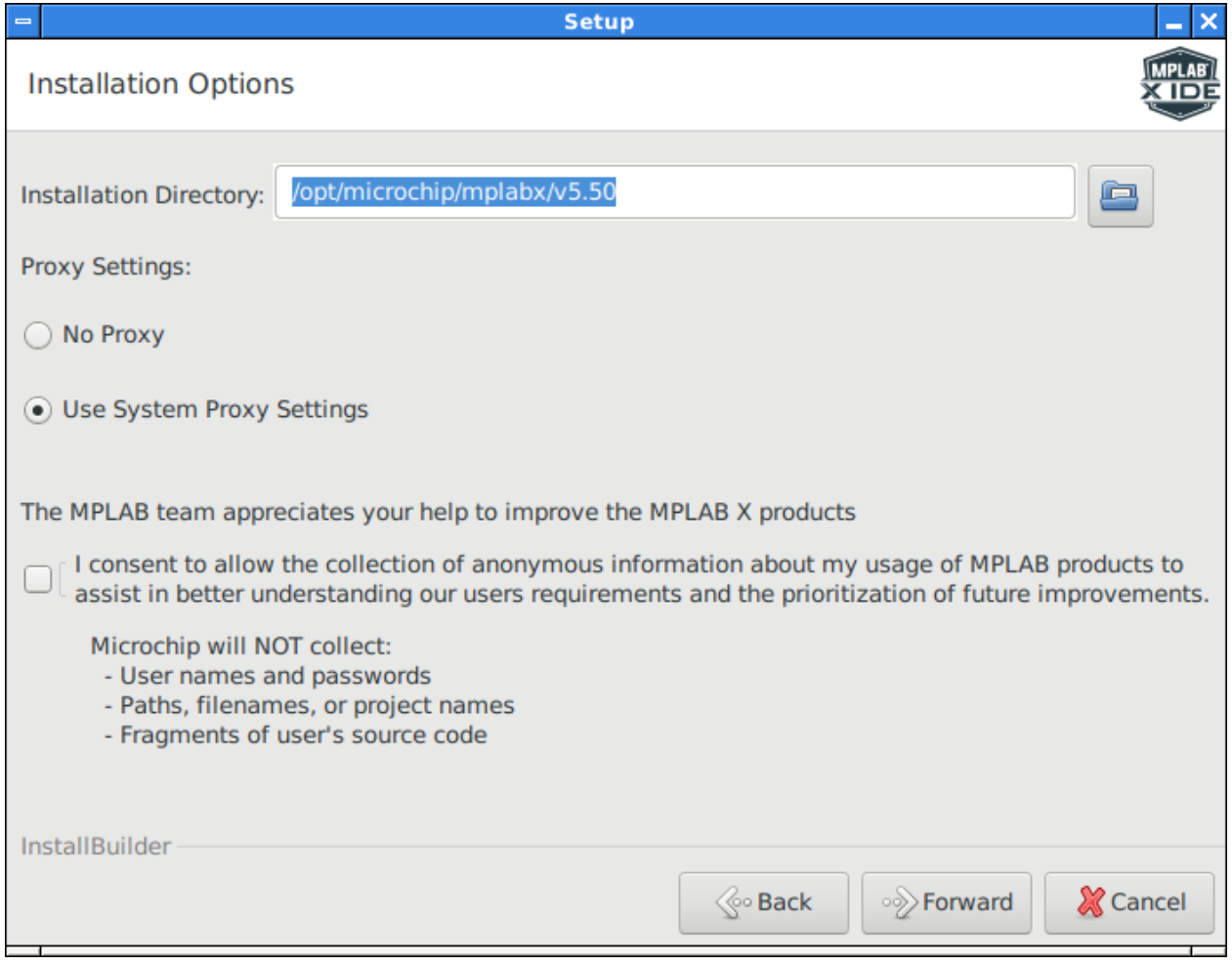
Note: All explanations are given for Linux systems!

1. MPLAB X

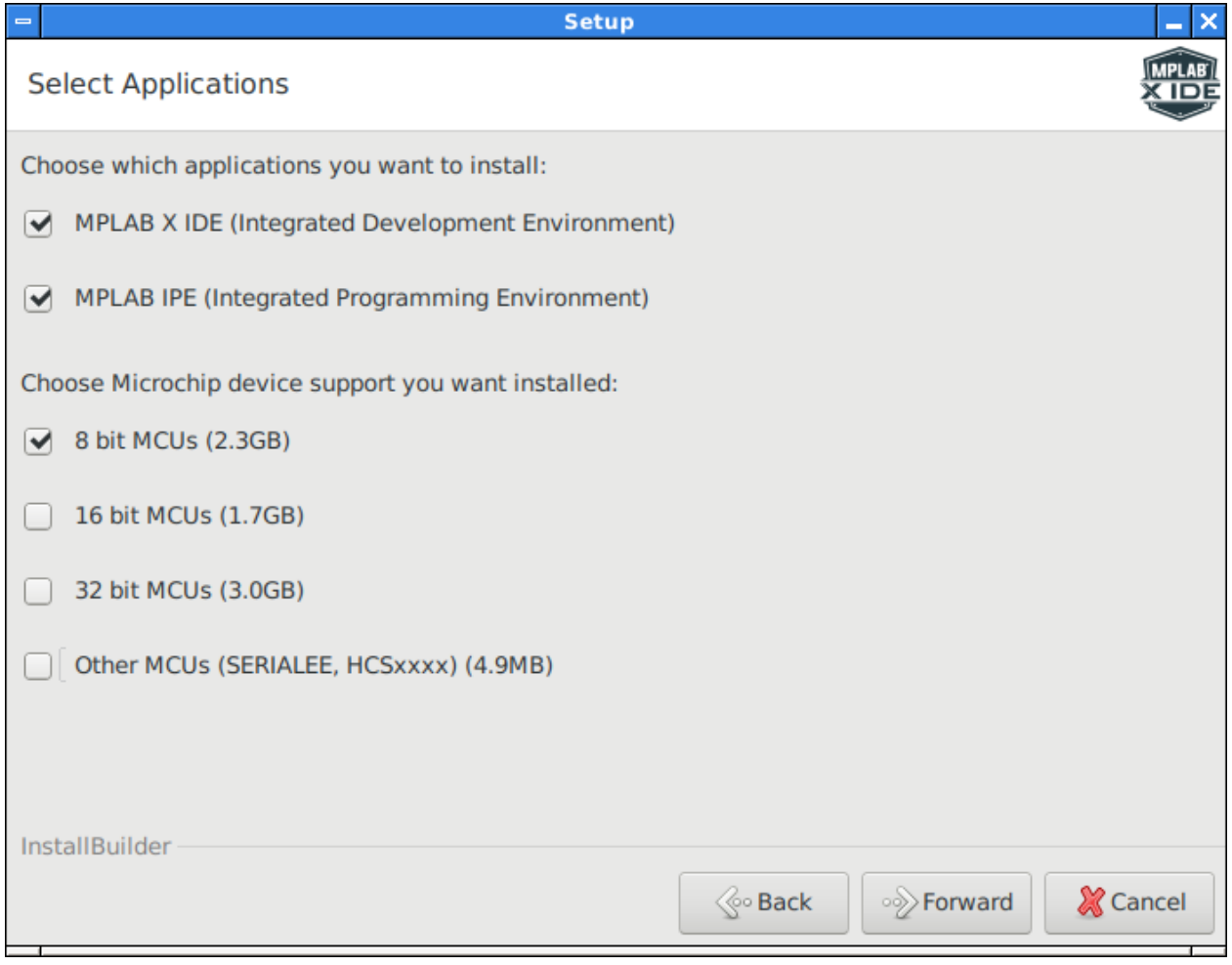
1.1 Download latest version from `https://www.microchip.com` (Tools and Software / MPLAB X IDE).

1.2 Launch the installer.

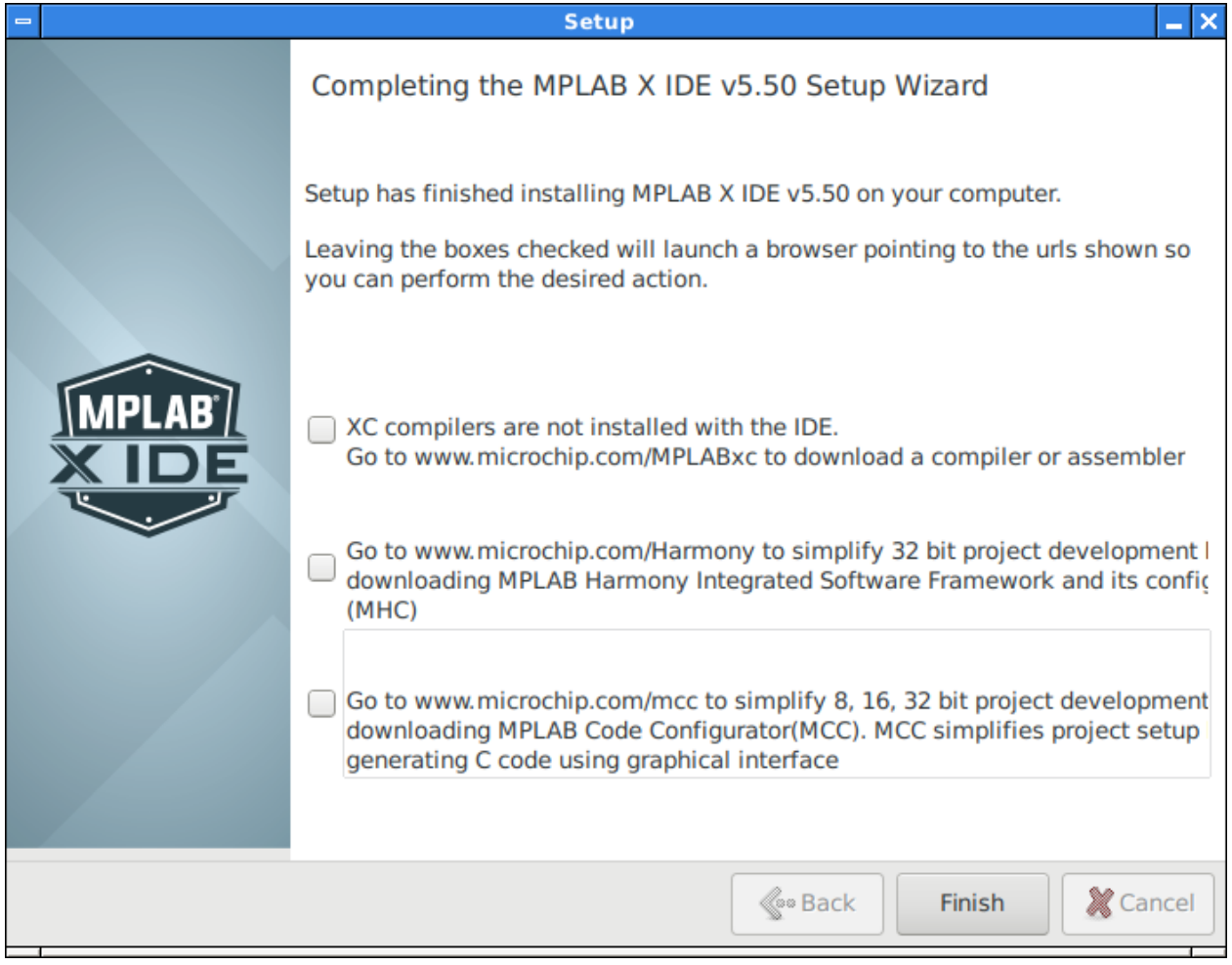
1.3 Make a note of the installation directory.



1.4 Select the IDE, the IPE, and (at least) 8-bit MCUs.



1.5 Do not install additional options at this stage.

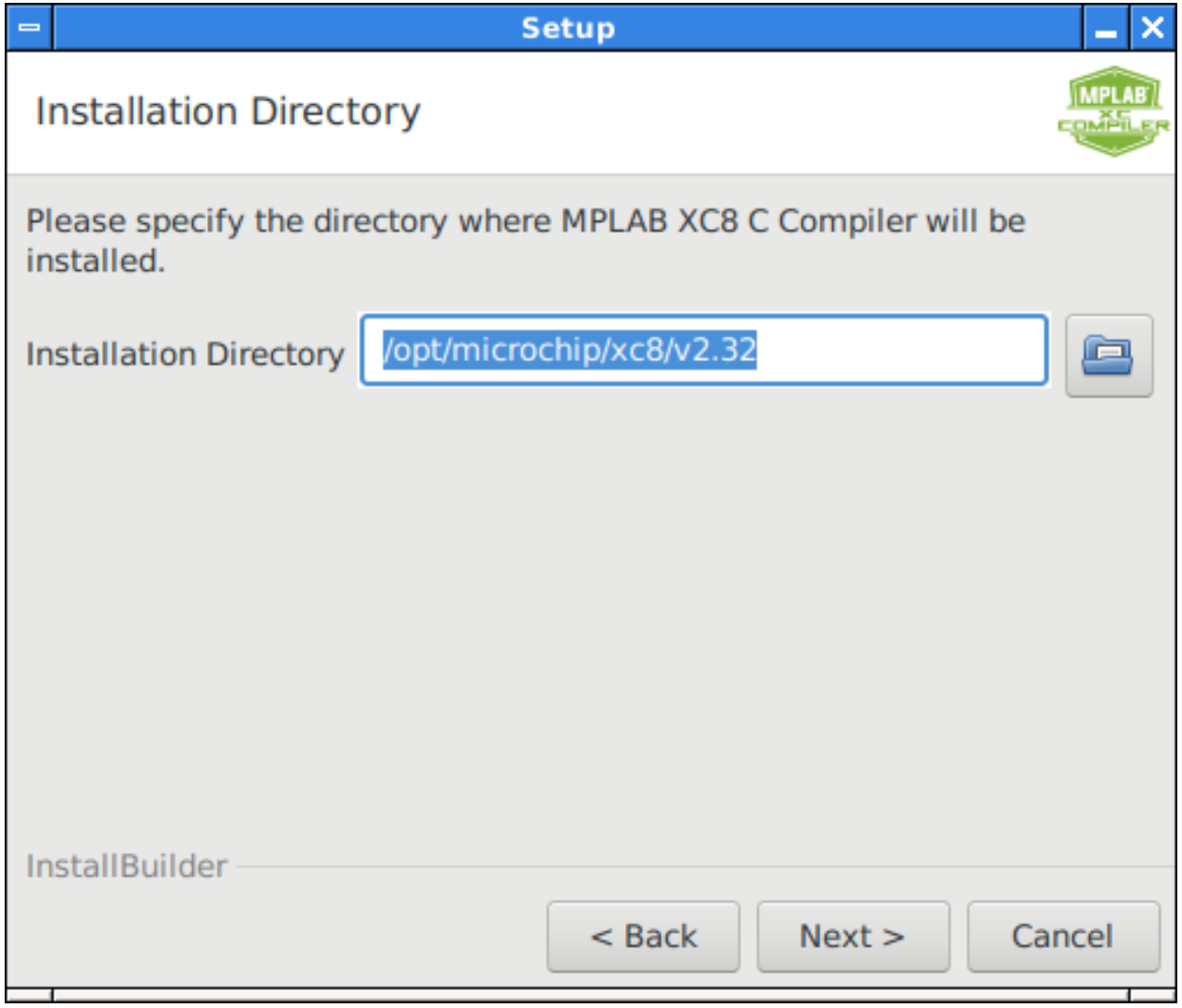


2. XC8 compiler

2.1 Download latest version from `https://www.microchip.com` (Tools and Software / MPLAB XC Compilers / Downloads / Compilers Downloads / MPLAB XC8 Compiler v2.32).

2.2 Launch the installer.

2.3 Make a note of the installation directory.



3. Check that everything works

3.1 Download `blink.asm` and `Makefile` from the webpage of the course (Exercise session 2).

3.2 Adapt the parameters in `Makefile`:

- `PROGRAMMER`: `PPK3` for PicKit 3, `PPK4` for PicKit 4.
- `AS-DIR`: directory containing the assembler.
- `IPE-DIR`: directory containing the IPE jar file.

3.3 `% make`

```
opt/microchip/xc8/v2.32/pic-as/bin//pic-as -mcpu=16F1789
-xassembler-with-cpp -Wa,-a -Wl,-preset_vec=0h -Wl,
-pisr_vec=4h blink.asm -o blink

Memory Summary:
    Program space        used    1Ch (    28) of  4000h words
    Data space           used     3h (     3) of   800h bytes
    EEPROM space         used     0h (     0) of   100h bytes
    Configuration bits   used     2h (     2) of     2h words
    ID Location space    used     0h (     0) of     4h bytes
```

3.4 Connect your PicKit 3 or 4 to your computer.

3.5 `% make flash`

```
java -jar /opt/microchip/mplabx/v5.50/mplab_platform/mplab_ipe/
/ipecmd.jar -TPPK4 -E -M -P16F1789 -F"blink.hex" -OL
DFP Version Used : PIC12-16F1xxx_DFP,1.2.63,Microchip
**********************************************
Connecting to MPLAB PICkit 4...
Currently loaded versions:
Application version.............00.06.87
Boot version....................01.00.00
Script version..................00.04.48
Script build number.............7acb7c9d66
Tool pack version ..............1.8.1120
The configuration is set for the target board to supply its
own power but no voltage has been detected on VDD. Please
ensure you have your target powered up and try again.
Connection Failed.
```

(This indicates that the programmer works but is not connected to a MCU.)