Lab 2

School of Architecture, Civil and Environmental Engineering

EPFL, SS 2017-2018

http://disal.epfl.ch/teaching/signals_instruments_systems/
Lab 2 Outline

• Concepts:
  – Makefiles
  – Compiling / modular programming
  – C versus Matlab programming performance
  – Structures variables + bitwise operators

• Tools:
  – gcc (C compiler)
  – Matlab
Practical Programming Tips

• Plan your program
  – Which files (.h and .c) do you need?
  – Which functions (input/output) do I need?

• Write small code bits at a time, and re-compile often!

• When debugging use `printf` to track the state of variables
Some standard C libraries

• Question 8:  `string.h`
• Question 22:  `math.h`

• Don’t forget to include them in the c files using the `#include`

Run matlab in Linux

- Open a terminal
- Write:
  ```plaintext
  $ matlab
  ```
Help on matlab functions

- In MATLAB command window
  - Write:
    ```
    >> doc function_name
    ```
If you have Linux problems running certain commands ... Upgrade your terminal to Bash

- Go to:

  https://cadiwww.epfl.ch/accountprefs

Login with your GASPAR username and password
Upgrade your terminal to Bash

1) Click “Modifier”
2) Change shell to “/bin/bash”
Numeral systems

- Decimal: 10 Digits: 0 to 9
  - 0, 1, 2 ... 9, 10, 11, ... 20, 21 ... 98, 99, 100
- Binary: digits 0 and 1
  - 0, 1, 10, 11, 100, ...
- Hexadecimal: 16 Digits 0-9, A, B, C, D, E, F
- Converting from one system to another:
  [https://www.rapidtables.com/math/number/Numeral_system.html](https://www.rapidtables.com/math/number/Numeral_system.html)
Bitwise operators – Example

locating road cracks

1 road = 50km
100GB memory

Real image
(high resolution)

(RGB)
4096x4096x3bytes
=50MB

(Only one picture/20m)

Binary image (1 or 0)

Compressing image:

```c
char b = is_crack(buff_im_r[i],
buff_im_g[i],
buff_im_b[i],);
buf_mem[i/8] =
buf_mem[i/8] | (b << (i%8));
```

Bitwise storage:

4096x4096x(1/8)bytes
=2MB

(more than one picture/m !)
Feedback for lab 2

In order to improve the labs, help us by filling out the feedback form on moodle

Thanks!