Lab 2

School of Architecture, Civil and Environmental Engineering

EPFL, Spring Semester 2019-2020

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:
  ```bash
  $ 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
Bitwise operators – Example

locating road cracks

1 road = 50km
100GB memory

Real image (high resolution)

(RGB)
4096x4096x3bytes
=50MB

(Only one picture/20m)

Bitwise storage:
4096x4096x(1/8)bytes
=2MB

(Binary image (1 or 0))

Compressing image:

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)));
Feedback for lab 2

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

Thanks!