

# Lab 2

*School of Architecture, Civil and  
Environmental Engineering*

*EPFL, Spring Semester 2019-2020*

[http://disal.epfl.ch/teaching/signals\\_instruments\\_systems/](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

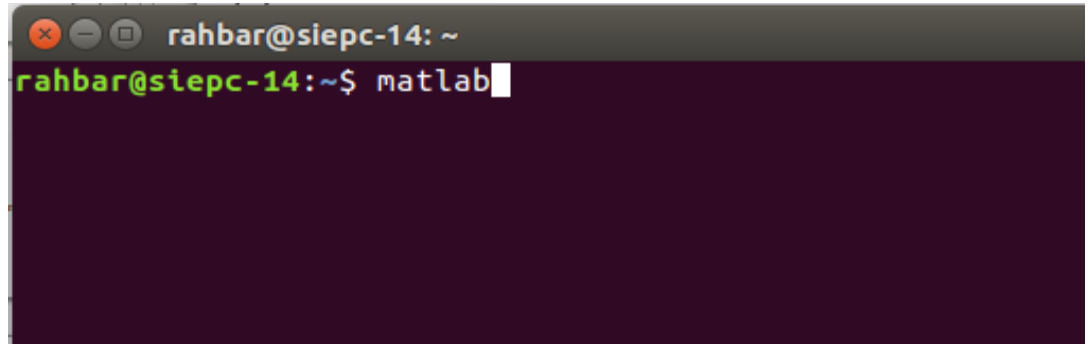
- Plan your program
  - Which files (.h and .c) do you need?
  - Which functions (input/output) do I need?
- Write small code bits at a time, and re-compile often!
- When debugging use `printf` to track the state of variables

## 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`
- More information in: <http://www.cplusplus.com/>

# Run matlab in Linux

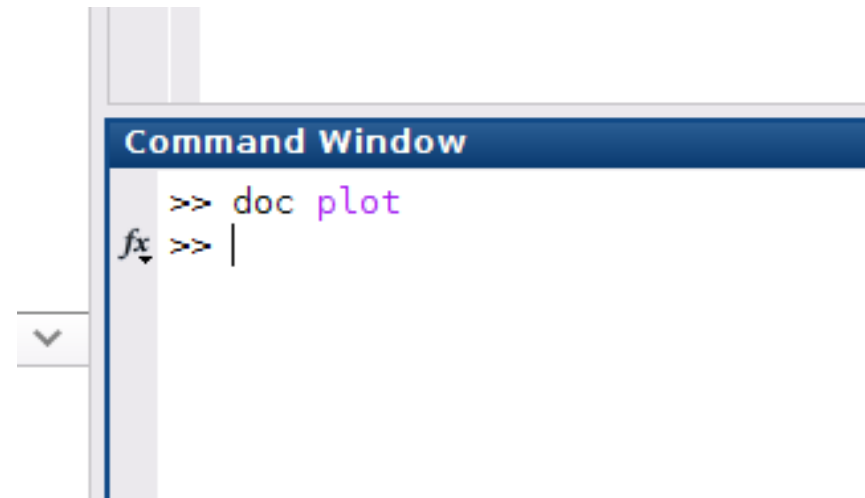
- Open a **terminal**
- Write:  
    >>matlab



```
rahbar@siepc-14: ~  
rahbar@siepc-14:~$ matlab
```

# Help on matlab functions

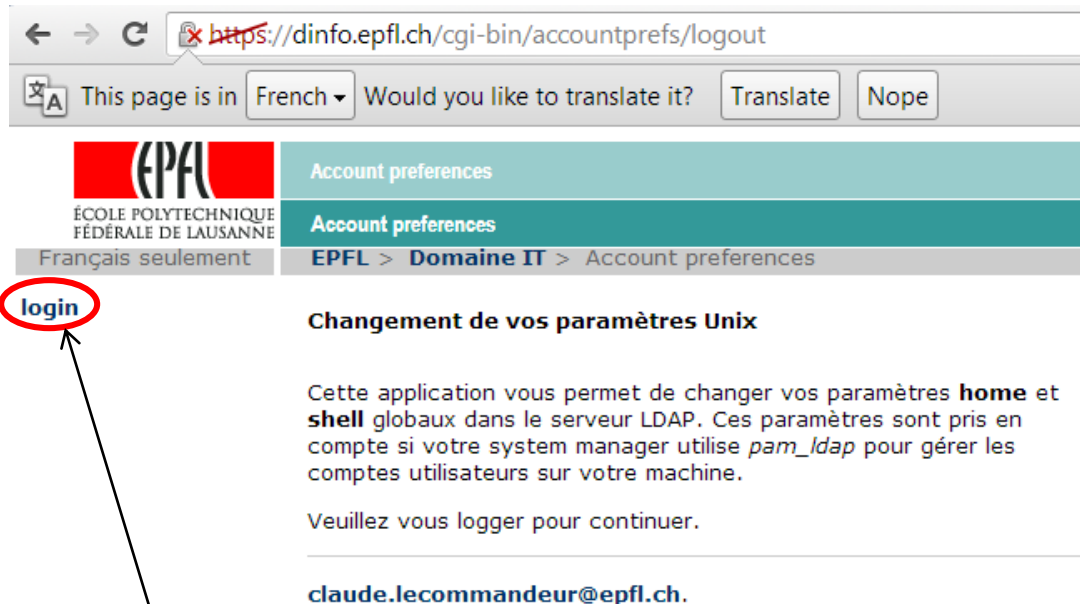
- In **MATLAB** command window
- Write:  
`>> doc function_name`



If you have linux problems running certain commands ...  
Upgrade your terminal to Bash

- Go to:

<https://cadiwww.epfl.ch/accountprefs>



← → ↻ ~~https://~~dinfo.epfl.ch/cgi-bin/accountprefs/logout

This page is in French Would you like to translate it? Translate Nope

**EPFL** Account preferences  
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE Account preferences  
Français seulement EPFL > Domaine IT > Account preferences

**login**

**Changement de vos paramètres Unix**

Cette application vous permet de changer vos paramètres **home** et **shell** globaux dans le serveur LDAP. Ces paramètres sont pris en compte si votre system manager utilise *pam\_ldap* pour gérer les comptes utilisateurs sur votre machine.

Veuillez vous logger pour continuer.

[claude.lecommandeur@epfl.ch](mailto:claude.lecommandeur@epfl.ch)

Login with your GASPAR username and password

# Upgrade your terminal to Bash

← → ↻ <https://dinfo.epfl.ch/cgi-bin/accountprefs/>

Account preferences

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Français seulement

EPFL > Domaine IT > Account preferences

[Page principale](#)  
[Logout](#)

### Changement des paramètres de ddacruz

|          |                          |                             |
|----------|--------------------------|-----------------------------|
| Username | <del>ddacruz</del>       |                             |
| Home     | /home/ddacruz            |                             |
| Shell    | /bin/bash                |                             |
| Automap  | This is the default map. |                             |
|          | Protocol                 | nfs4                        |
|          | Server                   | files0.epfl.ch              |
|          | Path                     | /dit-files0-t1/data/ddacruz |
|          | Security                 | krb5                        |

Voulez-vous [\[Modifier\]](#)

claude.lecommandeur@epfl.ch.

- 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)

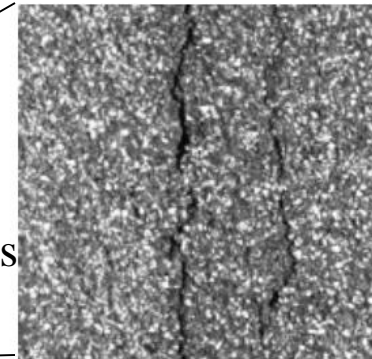
# Bitwise operators – Example

locating road cracks



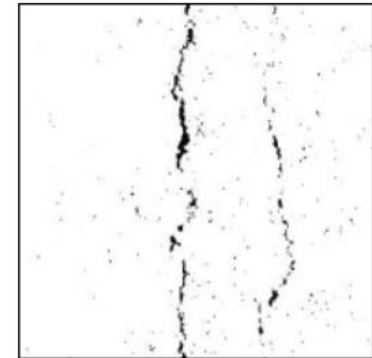
1 road = 50km  
100GB memory

Real image  
(high resolution)



(RGB)  
4096x4096x3bytes  
=50MB

(Only one  
picture/20m)



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));
```

Bitwise storage:

4096x4096x(1/8)bytes  
=2MB

(more than one  
picture/m !)

Binary image (1 or 0)

# Feedback for lab 2

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

Thanks!