

# CPU architecture & VHDL

```
entity vs_cpu is
```

```
port (  
    incout      : out bit;   
    ld_cnt     : out bit;   
    inc_cnt    : out bit;   
    clr_cnt    : out bit;   
    arload     : out bit;   
    pload     : out bit;   
    pcinc     : out bit;   
    drload     : out bit;   
    aload     : out bit;   
    acinc     : out bit;   
    irload     : out bit;   
    alusel    : out bit;   
    membus    : out bit;   
    pcbus     : out bit;   
    drbus     : out bit;   
    read_mem  : out bit);
```

```
end vs_cpu;
```

Don't Panic!

# CPU architecture & VHDL

---

It can be fun too!



Both images from <http://micro.magnet.fsu.edu>

## Module Aims:

- to introduce HDLs for system design
- use of programmable logic devices
- explore a simple CPU in detail
- extend understanding of state machines
- introduce verification, validation & testing
- System on single chip design
- Hardware - Software integration

## Books on VHDL :

- Digital system design with VHDL, Mark Zwolinski, Prentice Hall
  - new edition due
  - He's our external examiner!
  
- VHDL Analysis and Modeling of Digital Systems, Z. Navabi, McGraw Hill
  - very, very expensive.
  - It's in the library.
  
- Search the Library, VHDL books are in the engineering section, not in computing.
  - Warning: Behavioural v RTL v Structural

## Books on Digital/CPU :

- Computer Systems Organization & Architecture, John Carpinelli, Addison Wesley
  - excellent, I use it a lot for this module
  - but, there's only a little VHDL in it.
  
- Digital Design, Principles & Practices, J. Wakerly, Prentice Hall
  - v. good digital cookbook with some Verilog & VHDL
  - but it's out of print :(
  - lots of them in the library :)
  
- Again, use the library.

## Tools and Toolkits :

- Alliance VLSI design <http://www-asim.lip6.fr/recherche/alliance/>
  - It's free and runs on most platforms.
  - It works well (mostly).
  
- Emacs with VHDL support.
  - Learn to love it.
  - Do the worksheet on using emacs with VHDL
  - Learn some of the hot-keys
    - ▷ what does 'C-x C-( ' ..... 'C-x C-)' do ?

## Worksheets :

- These are really important! If you want to pass, then do all the worksheets.
- They are available online from my webpage in PDF format.

## Lab Tutors:

- Use them. Ask questions. Be proactive not reactive

## Lab sessions :

- Go to them, this is a practical module.