F28HS Hardware-Software Interface

Lecture 0: Overview/Edinburgh

Lecturers

- Hans-Wolfgang Loidl
  - EM G51
  - H.W.Loidl@hw.ac.uk
  - X3421
- Mehran Sharghi
  - EM G50
  - m.sharghi@hw.ac.uk

Aims

- To gain an understanding of low-level, hardware-oriented and systems programming.
- To develop skills in resource-conscious programming.
- To develop programming skills in such languages.

Syllabus

- Low-level, assembler programming
- Low-level, C programming
- Advanced computer architecture issues impacting software performance (caches, multi-cores, etc)
- Operating system interfaces for low-level software

Syllabus

- Operating system concepts such as device handling, interrupts, BIOS etc
- Embedded systems programming
- Resource-conscious programming techniques (memory, performance; programming techniques, tools, monitoring)

Subject mastery

- Critical understanding of computer architecture concepts and their performance implication for low-level software.
- Detailed theoretical and practical understanding of hardware and operating system concepts, interfacing to low-level software.
- Ability to develop efficient, resource-conscious code, interfacing to hardware components.
- Practical skills in low-level, systems programming, with effective resource management.

Personal abilities

- Ability to articulate system-level operations and to identify performance implications of given systems

Assessment

- coursework: 40%
- exam: 60%

Timetable

- Monday 11.15-12.15 PGG01
  - **lecture** - always MS
- Monday 16.15-17.15 JW2
  - **lecture** - always HWL
- Tuesday 12.15-13.15 JW2
  - **tutorial** – weeks 1 3 5 7 9 11 HWL
  - **tutorial** – week 2 4 6 8 10 12 MS

Timetable

- Thursday 11.15-12.15/Friday 11.15-12.15 EM2.50
  - **- laboratory**
  - HWL weeks 1 3 5 7 9 11
  - MS weeks 2 4 6 8 10
  - **labs attendance is really important!**
- Monday 13.15-14.15 EM2.50
  - **laboratory** extra for GA students
  - on demand, so not every week, start around week 4
  - Monday 13.15-14.15 EM2.50
- Code Clinics
  - a drop in session for students to ask about coding questions

Assessed coursework

- MS
  - 1 programming in C exercise
    - 20%
    - distributed: week 4
    - submission: week 8
  - coursework will be individual

Assessed coursework

- HWL
  - 1 coursework on systems programming on the Raspberry Pi 2
    - 20%
    - distributed in Week 7
    - submission in Week 12
  - bringing together C & assembler programming, applied to systems programming
  - coursework will be done in pairs

MS stuff

- All my teaching material will be on Vision
- Office hour is Weds 11.15-12.15
- Send me email or catch me after a lecture if you need help with anything
- lecture captures will be available on vision

HWL stuff

- my main course information page, with all my teaching material is at: http://www.macs.hw.ac.uk/~hwloidl/Courses/F28HS
- material is also available through Vision
- my office hour is Thu 2:15-3:15pm or
- just contact me per email, or after a lecture
- lecture captures for all lectures and tutorials will be available on my course info page

Raspberry Pi

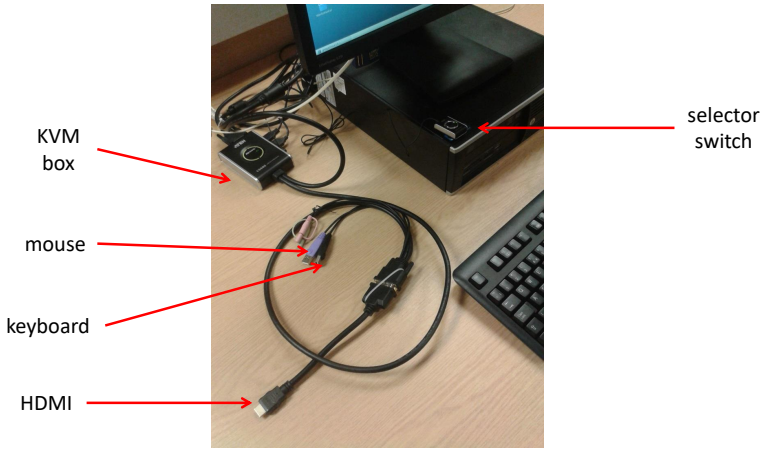
- course based around Raspberry Pi 2 computer
- single board system
- 900 MHz quad-core ARM Cortex-A7
- 1 GB RAM
- runs Raspbian variant of Linux
- BCM 2835 General Purpose I/O (GPIO) chip for hardware/software experiments

Raspberry Pi

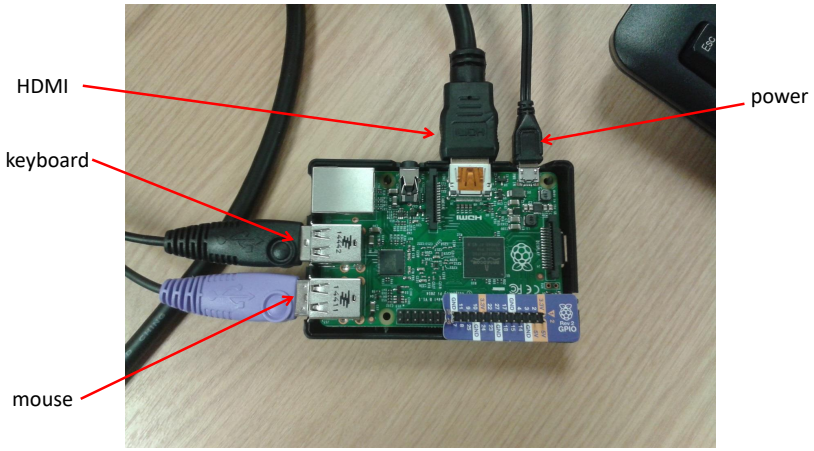
- Raspberry Pi 2 + hardware kit
- available on loan from Computer Technician
- plug in to monitor/mouse/keyboard for Linux desktops in EM 2.50
  - KVM (keyboard-video-mouse) switch

Raspberry Pi

Raspberry Pi

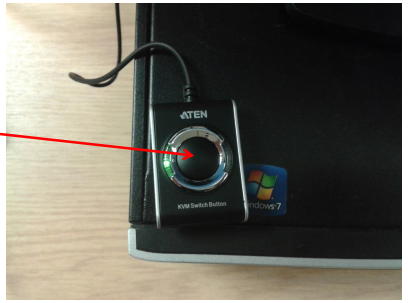


Raspberry Pi



Raspberry Pi

- plug in mouse, keyboard &HDMI
- push KVM button
- login: `pi`
- password: `raspberry`
- to run GUI: `startx`



Raspberry Pi

- must collect from:
  - Computing Technician, EM 1.32
  - **pick up RPi before week1 Tutorial on Tue 11:15**