Computer Peripheral & Interfaces (Introduction)

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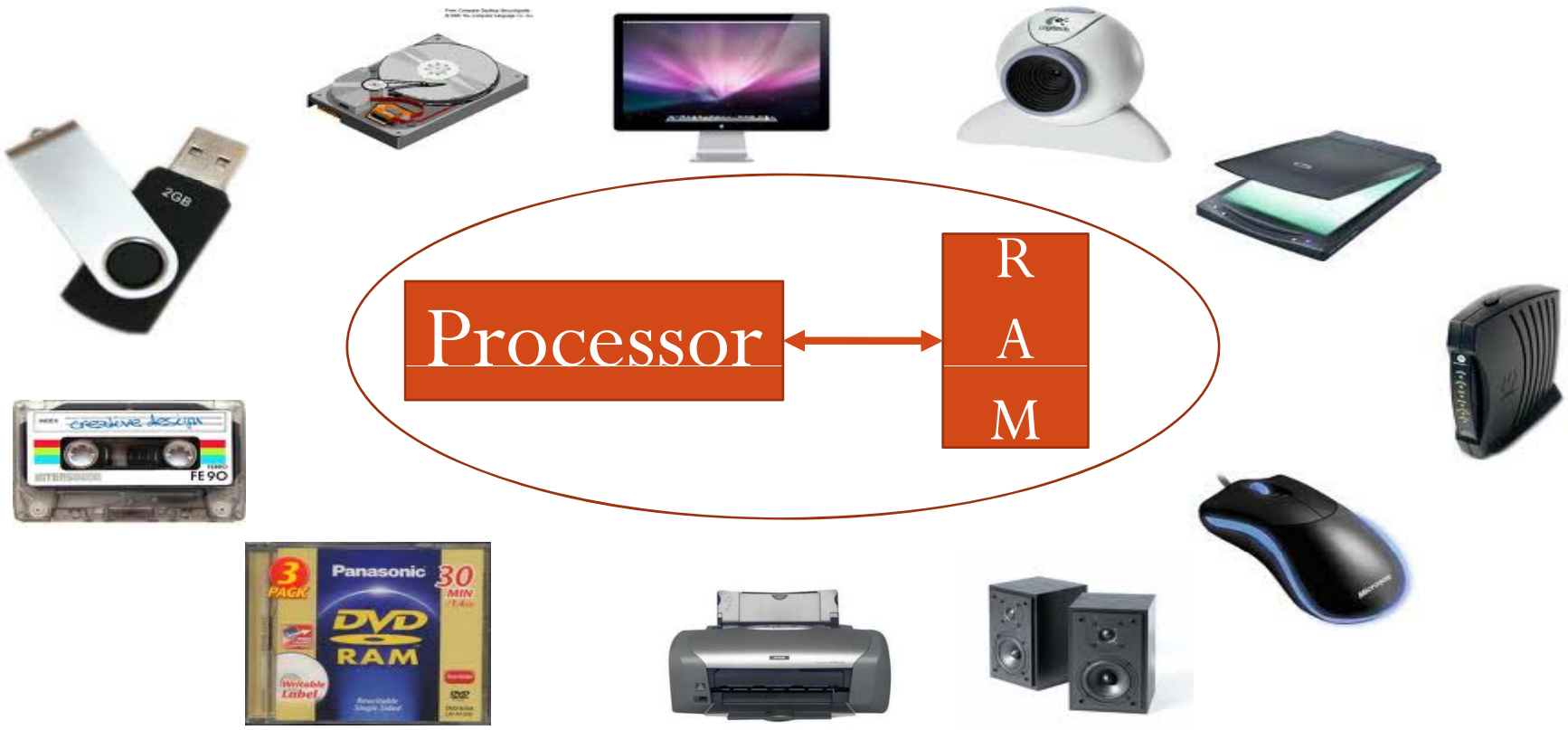
Outline

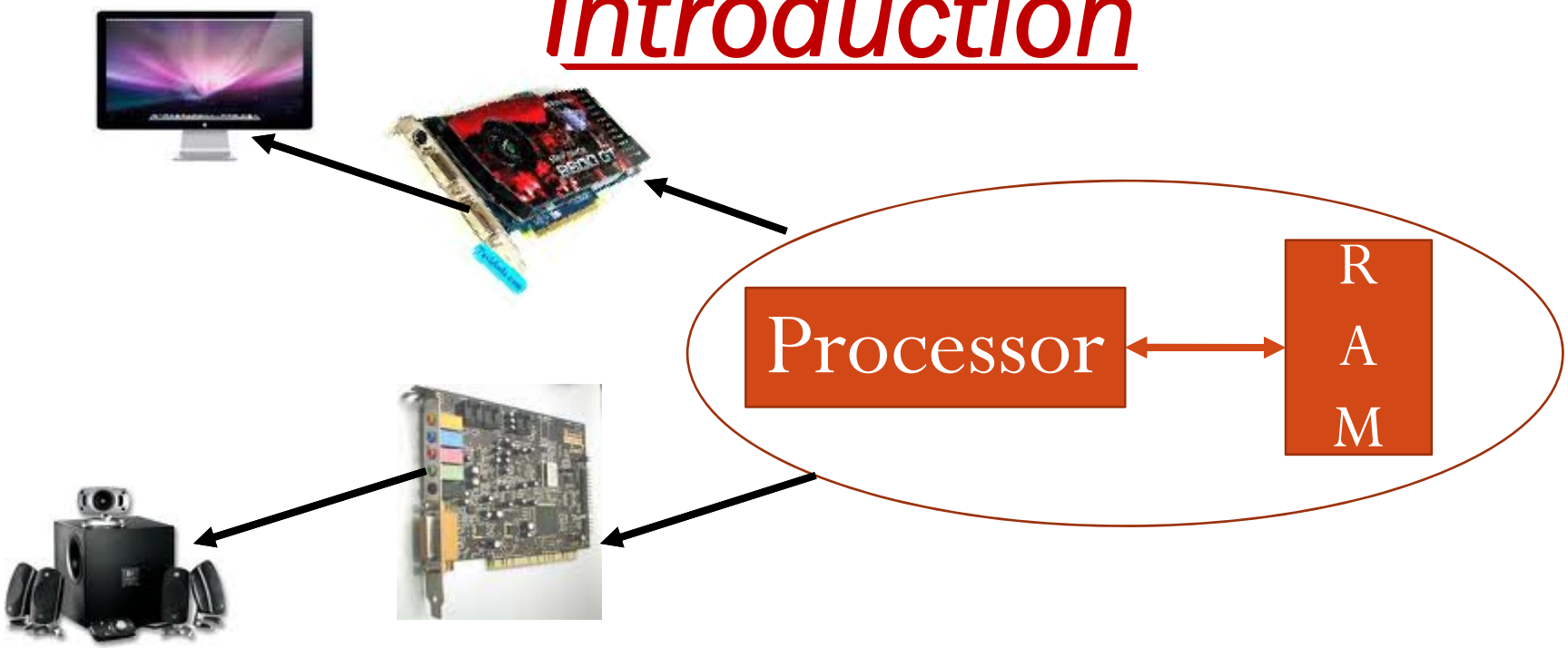
- Introduction
- Motivation
- Course structure & Reference Books
- Class timing
- Rules & Examination
- Lab part (CS422)

Introduction



- Computer Systems
  - Internal (processor + memory (RAM))
  - Peripheral (Disk, Display, Audio, Eth,..)

Introduction

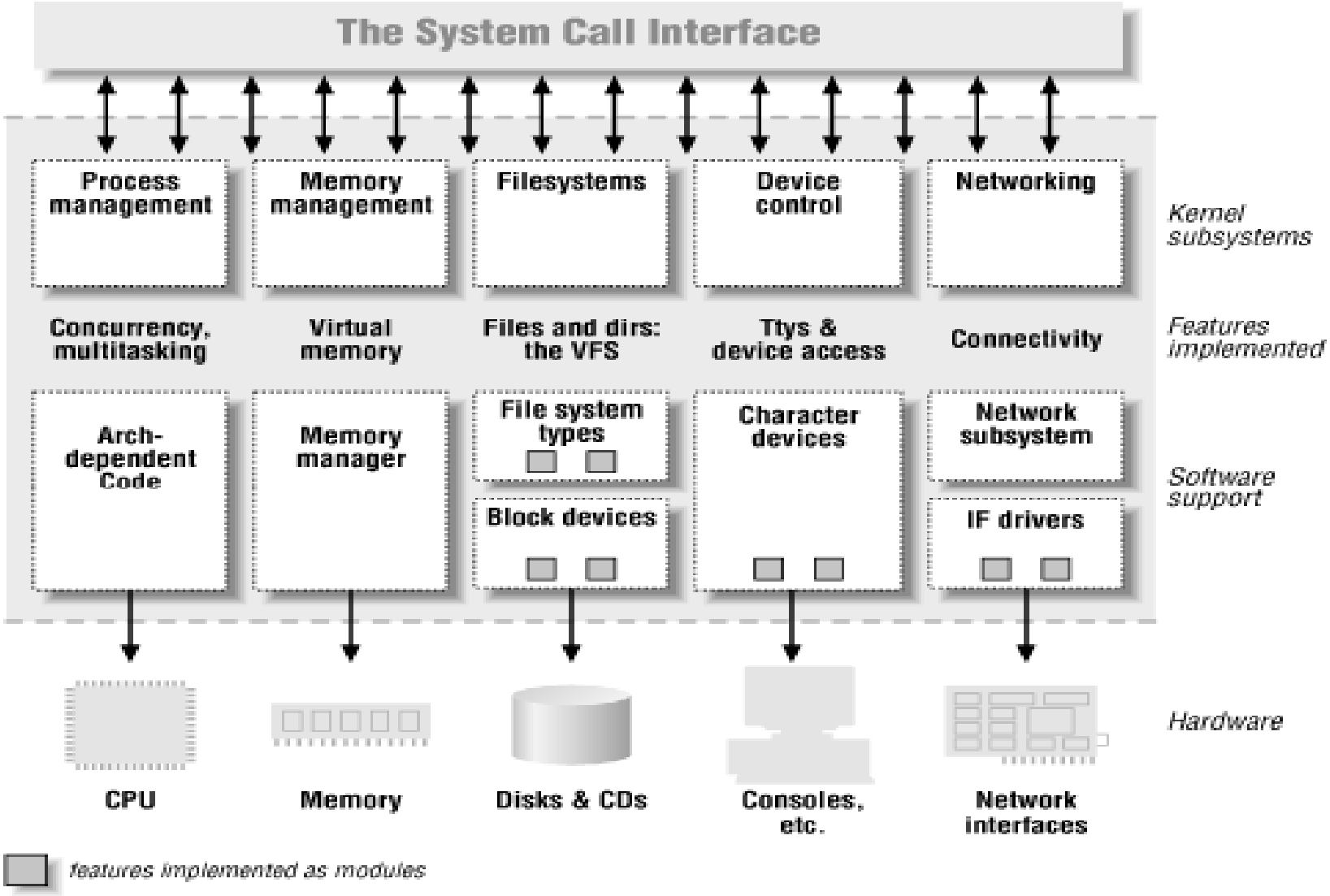


- Peripherals : HD monitor, 5.1 speaker
- Interfaces : Intermediate Hardware
  - Nvidia GPU card, Creative Sound Blaster card
- Interfaces : Intermediate Software/Program
  - Nvidia GPU driver , Sound Blaster Driver software

Introduction

- Interfaces
  - Intermediate Hardware
    - Timer, Counter, DMA, USB, UART,
    - Peripheral Controller
  - Intermediate Software/Program
    - Device driver (Linux)/ Assembly Code
- Peripheral Component Interconnect(PCI)
  - Audio card, VGA card, Ethernet card
- Low level signal + high level C code

Linux Kernel Split View



Linux Device Driver by Jonhantan Corbet

Motivation

- Knowledge: both hardware & software
- Exact interface: Architecture & OS
- Used in many places (Computer +ES)
  - All embedded system (mobile, laptop, ..)
- Highly paid job in industries
  - Intel (BIOS, driver), Sony, Motorola, ..
- Low level signal + Device drivers

Motivation Contd..

- Knowledge of simple peripherals
  (Display, Audio, Disk drives, Ethernet)
  In connection with 8085/8086
- Peripheral are powerful than main computing, knowledge of advance peripherals
  - Linux/Window device drivers
  - Dolby Digital Stereo, HD Cinema
  - Most influential technology of 2010
    - USB 3.0, Bluetooth 4
    - Graphics cards (Nvidia with 480 core)

Motivation Contd..

- Use of old technology in newer devices
  - Intel Atom processor (PII technology with modification)
  - Use of winXP in mobile; may be obsolete for PC
- Combining peripheral controller in main computing for low power
  - Intel Centrino have wireless controller functionality inside processor chip
  - Intel atom 45x have DDR2 memory controller + Graphics controller in inside processor chip

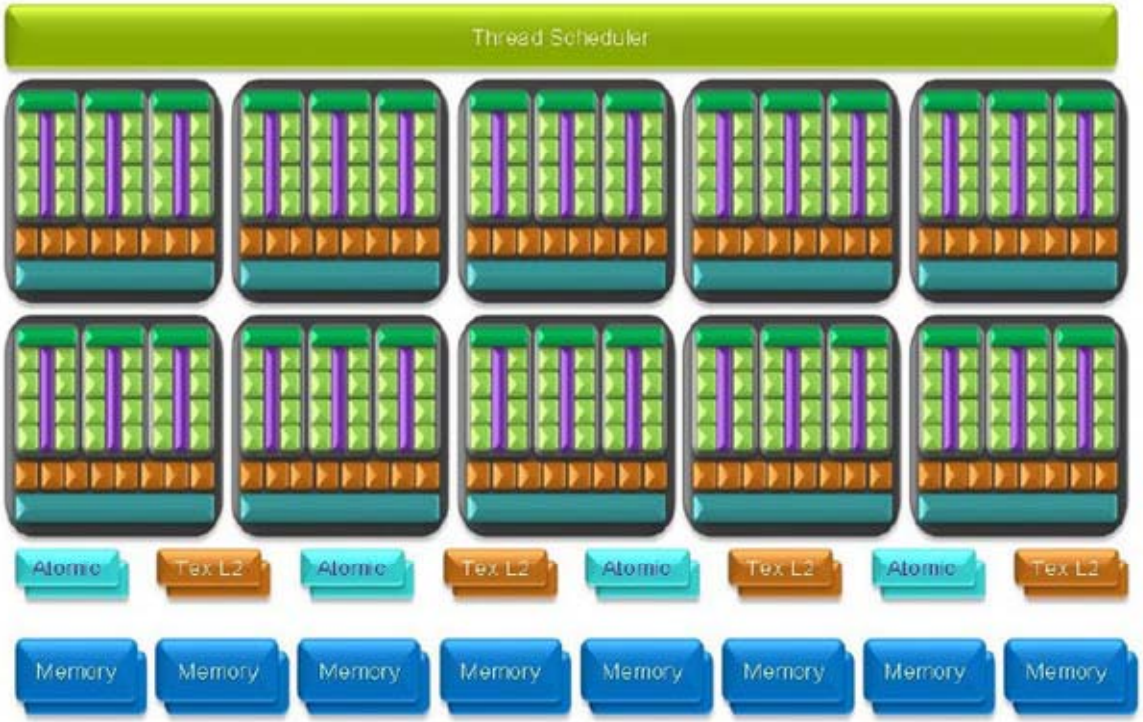
Dolby Digital

- Stereo: Moving origin of sound in a line
  - Stereo Ear Phone:
  - Stereo Image: to calculate Depth : why two eye in human face?
- Dolby Lab: 5.1 (5 normal + 1 subwoofer)
  - 5 normal : 20-20Khz, 1 low freq (20-120K)
  - RFront,Centre,LFrnt, RSorround, Lsorrnd
  - Max bit rate: 560 bit/s
- Dolby HD : 7.1, Max bit rate:18MBs

HD Cinema

- Video : 30 frame/ Sec
- 1 Hr Video size with out compression
  - (Resolution).(3 color).(2byte).(30F/S).60M.60S
  - VGA:640x480: 199GB , Comp: 450 Mb
  - 720p:1280x720: 597GB, Comp:1.2Gb
  - 1080p/i:1920x1080: 1.35TB, Comp:2.4G
- MP2, MP4, MKV matryoshka (nested doll)
- Cinema:Old-2K(2048×1080),New- 4K(4096×2160)
- TI- Digital Light Processing, Sony: SXRD (Silicon X-tal Reflective Display), LCOS (liquid crystal on silicon)

MI Tech 2010 :Nvidia GPUs



- Nvidia GTX295, 480 Cuda core
- VGA upto Res: 2048x1536, Dual monitor
- HD Cinema, Play MKV File

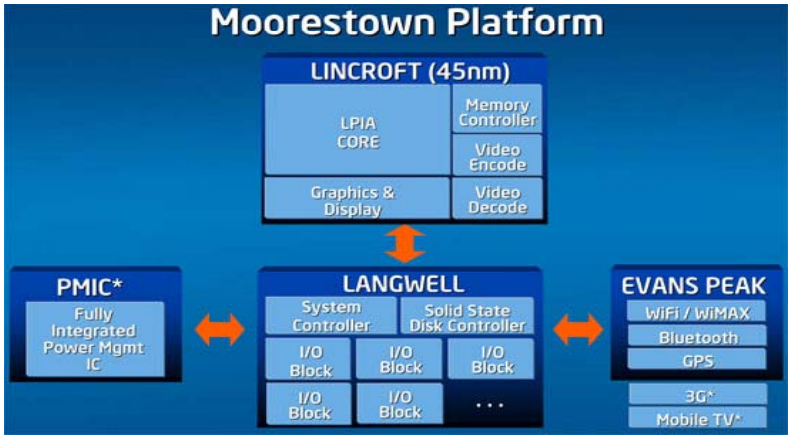
MI Tech 2010 : USB 3.0

- SuperSpeed" bus
- Enhanced Host Controller Interface (EHCI)
  - Register-level interface: Host Controller for the Universal Serial Bus (USB2.0)
  - SATA HDD: Serial Adv. Tech. Attachment.
- USB3.0: Transfer mode at 5.0 Gbit/s =400MB/s
- It uses
  - 8B/10B encoding, LinearFBshftReg (LFSR) scrambling for data, Spread Spectrum.
  - Receivers: low freq periodic signaling, dynamic equalization & training sequences

MI Tech 2010: Bluetooth 4.0

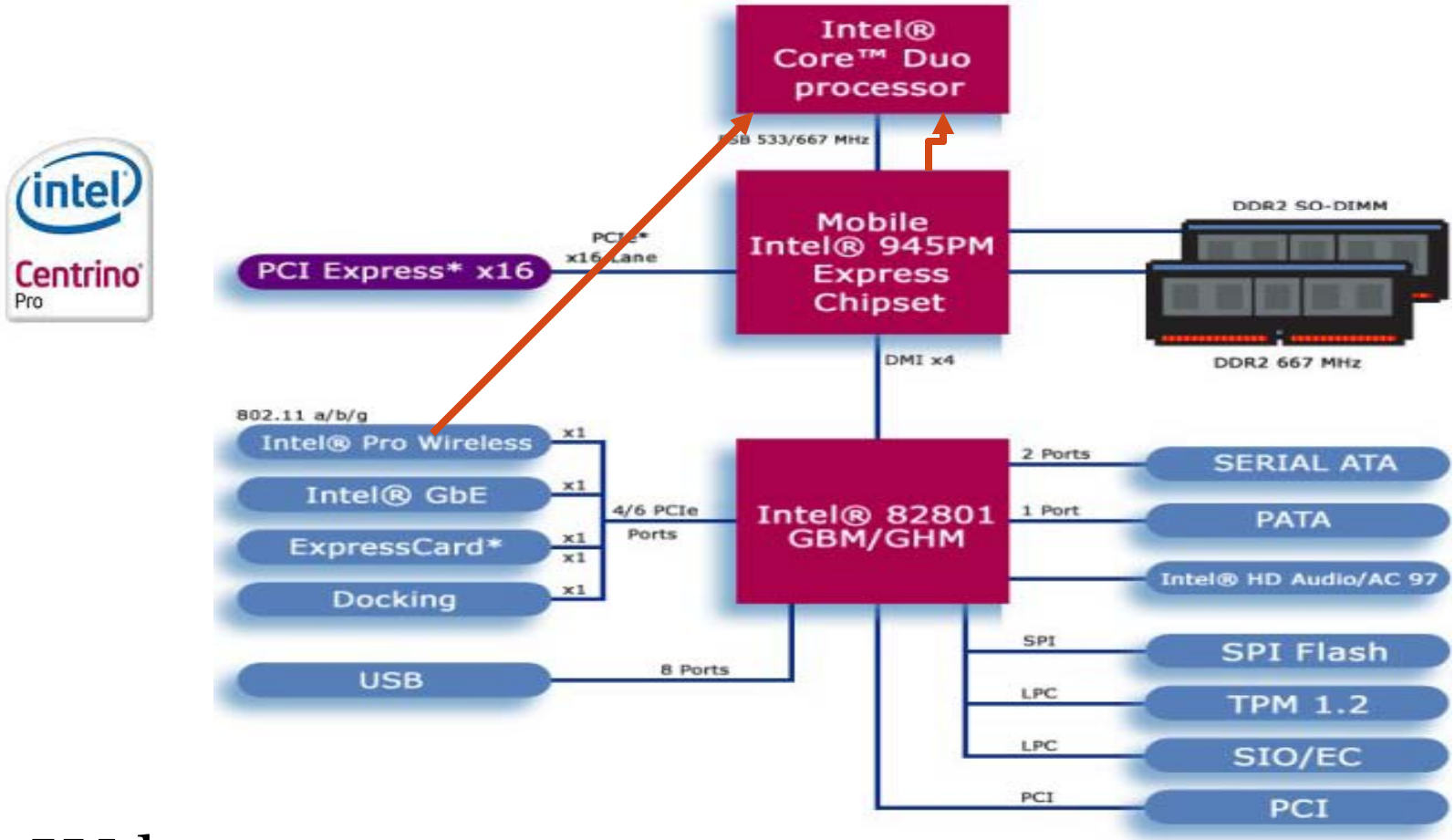
- Classic Bluetooth
  - Radio: Freq Hop Spread Spectrum, 2.4Ghz
  - 1Meters, 3MB/s
- Bluetooth high speed (based on WiFi)
- Bluetooth low energy (Added 4.0 Spec)

Peripherals Controller Migration



- Cards on Mother board
- Onboard: graphics, modem, audio, Wireless
- Inside processor: graphics, memory cont.

Intel Centrino Processor



- 5X better wireless performance with Proactive Security (Added Instruction to support this)
- Longer Battery Life (Low power instr & FUs)

Intel Atom Processor

- Old Pentium architecture with modification (Low power addition) : 10Watt
- Default: MMX, SSE (Streaming SIMD)
- Inside processor chip
  - Graphics processor, Memory controller
  - Wireless controller (Centrino Atom)

Course Structure: CCS421

- Intro to 8/16/32 bit microP and its programming.
  - *(2 Prog Assignments - one in 8085 &other in 8086 simulator)*
- Interfacing devices such as
  - displays Kbd, DAC/ADC.
- Using programmable chips like
  - I/O ports, timer/counter, kbd/display cont.,
  - DMA cont., Interrupt cont. etc.
  - Familiarization with MDS other Bus standards
    - IEEE 488, VME, MULTIBUS, SCSI, ISA/EISA, PCI.
- Selected peripheral devices and their characteristics.
  - Dolby Stereo, HD Cinema, Gigabit Ethernet
  - Device &driver for HD Audio, Nvidia Graphics card
  - Linux device driver *(2 Programming Assignments)*

Rules & timing

- Timing Slot A
  - ~~Monday 8 AM – 9 AM (Skipping)~~
  - Tuesday (9 AM - 10 AM), Wednesday (10 AM - 11AM), Thursday (11AM -12 AM)
- Venue: 1201
- Rules
  - 75% attendance mandatory
  - 10% Assignment + 40% mid term+ 50% end term
  - Copy cases lead to negative marks (-ve Max mark)
  - For AA Grade: marks in all parts should be positive

Lab part

- CS422 Lab
- 8085 Microprocessor Kit
- Will be taken by Prof SB Nair
- Hardware laboratory
- Microprocessor Development System
  - Timer, sensor, DMA, peripheral controller

Book

- Text
  - R S Gaonkar, "Microprocessor Architecture, Programming and Application with the 8085", 5th edition, Penram India
  - J. Corbet, A Rubini, "Linux Device Driver" 3rd Edition, O'relly publisher
- References
  - D V Hall, Microprocessors and Interfacing, TMH, 1995
  - M B Cook and H White Neil, Computer Peripherals, 3/e. London: Edward Arnold, 1995.
  - L F Doyle, Computer Peripherals, Prentice Hall, 19

Course Website

http://jatinga.iitg.ernet.in/~asahu/cs421/

Thanks