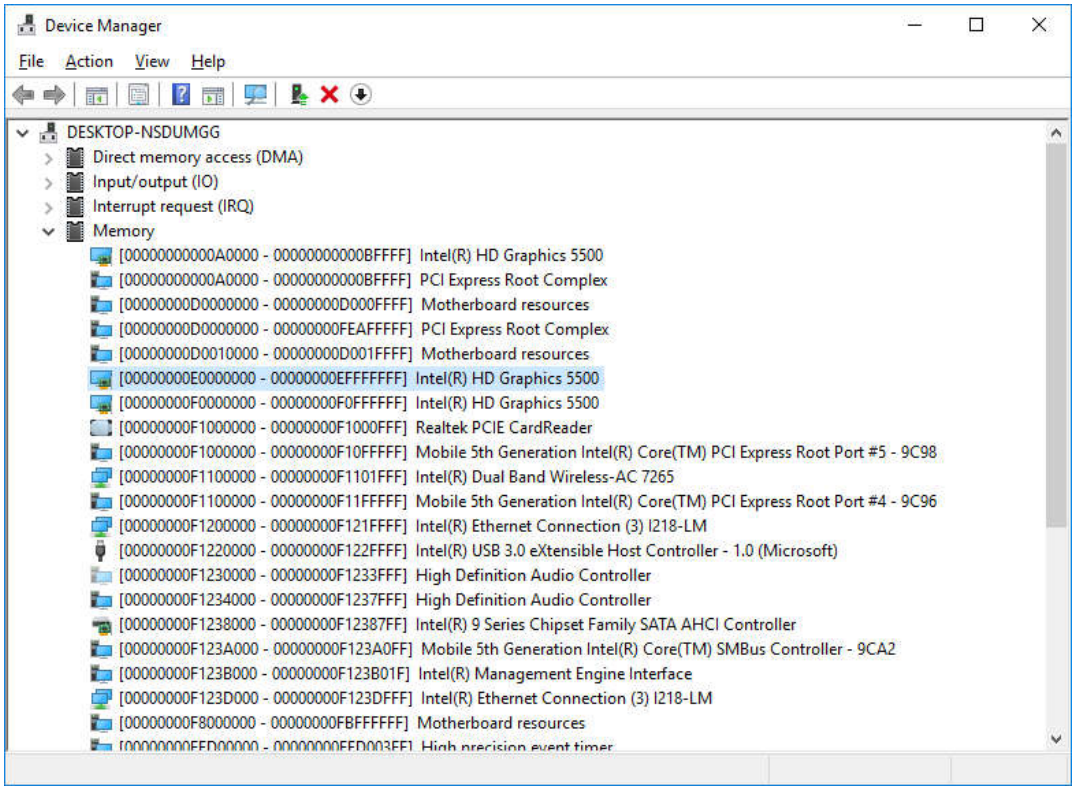
Digital microsystems design

Lab 2

Memory map

- x86/x64

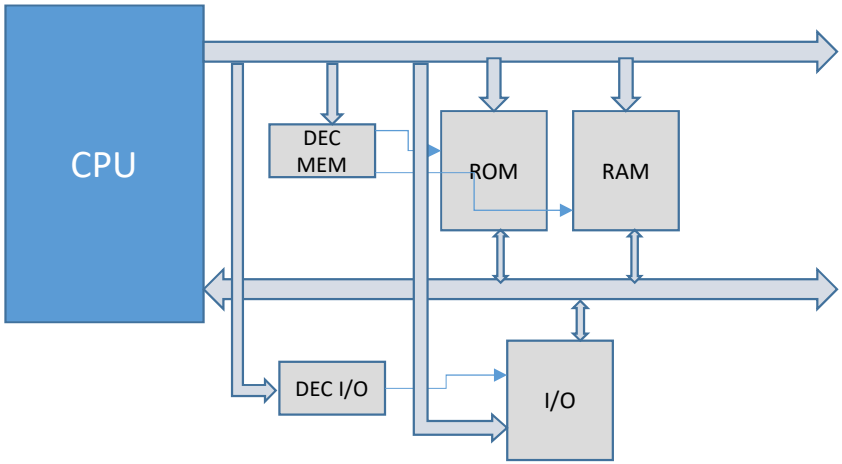


Exercise

- Design the memory map and memory decoder for a 16 bits microprocessor system with 20 address lines using the following memory requirements:
  - 128KB EEPROM ending at FFFFFH, using 64K x 16 bits memories
  - 128KB SRAM starting at 00000, using 64K x 16 bits memories
  - 128KB DRAM, using 32K x 16 bits memories

Overview

- External connectivity of a microprocessor
  - Memory / I/O connectivity



Step 1

- How many circuits are needed?
  - No of circuits = size of the required memory / size of the available memory circuits
  - No of EPROM circuits = 128 KB / (64 K x 16 bits) =
    = 128 KB / 128 KB = 1
  - No of SRAM circuits = …
  - No of DRAM circuits = …

Step 2

- Visualize the systems (block diagram)

Step 3

- Characterize each circuit
  - Size, number of address lines, range of addresses
  - EPROM circuit: 128 KB = 2^7 x 2^10 = 2^17
    - 17 address lines

$$2^{17} = 1\,\underbrace{000\ldots00}_{\text{17 of 0}} = 20000\ H$$

    - Address range: 00000H – 1FFFFH

Step 4

- Memory map