ARM Cortex – A9 processor

- ARM processors are used ~100% of all smartphones / tablets and industrial applications (T.V.s, cars, factories, medical equipment...)

- ARM : Advanced RISC machine

  Reduced Instruction Set computer.

- RISC processors have a relatively simple instruction set compare to the alternative, which is generaly called complex ISC (CISC)

DE1-SoC Computer.

- your programs will run on the ARM processor in this computer system. and access various I/O ports that are mapped to addresses.

- Every processor has a unique Instruction Set Architecture (ISA), which defines the processor registers, set of instructions, and assembly language.

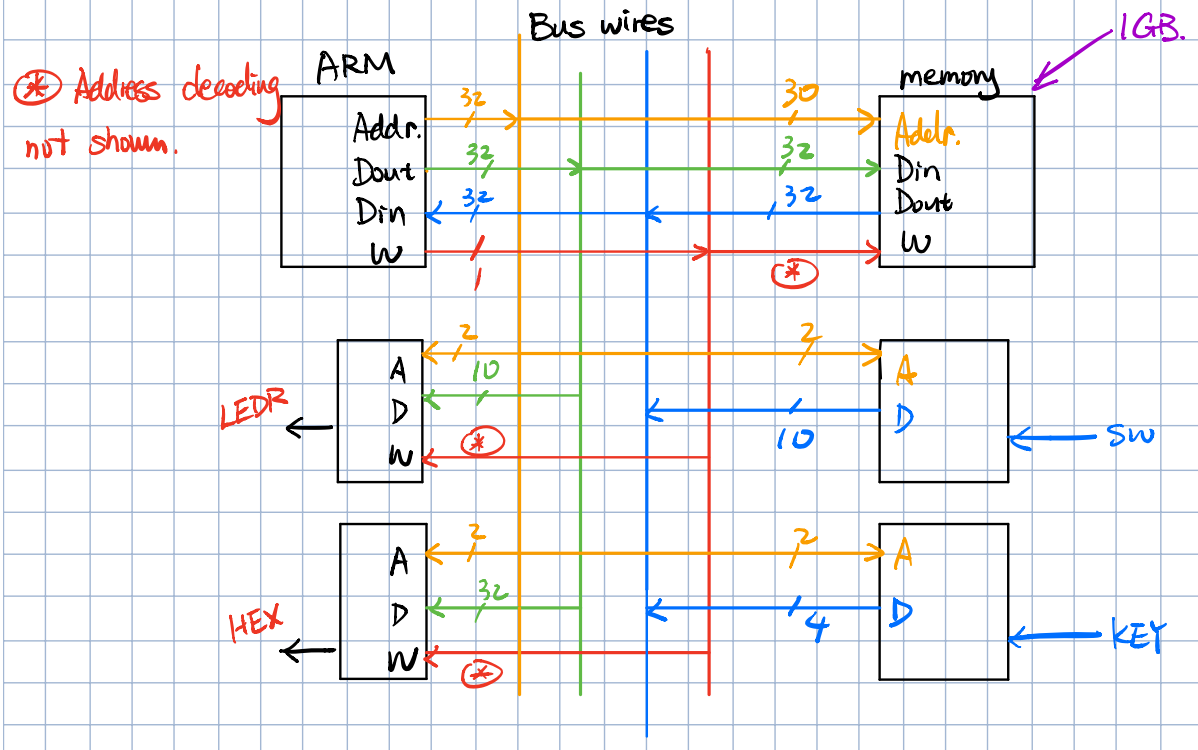
- your processor: 8 registers. (r0 – r7, r7 = PC), 8 instructions. (mv, mvi, add, sub, ld, st, mvnz, mvnc)

- ARM Cortex-A9 has 32 bits registers called r0-r15 (r15=PC), and many instructions. You can write assembly code and use an assembler to generate machine code. If you write C code, then a complier generates Assembly code, which is then assembled to machine code.

Memory Architecture.

- In the ARM processor, there's a 32-bit memory interface. Both

addresses and data are 32-bits wide. But the ARM processor can access (read/write) individual bytes in a memory word. Hence, every byte has its own address.



* Address decoding not shown.

Address map

- for the DE1-SoC Computer, the main memory is 1GB, w/ addr. 0 to 3FFF FFFF
- LEDR output port addr. FF200000
- HEX output port addr. FF200020 and FF200030
- SW input port addr. FF200040
- KEY input port addr. FF200050