**Data Path Units**

**Intel 8080**

The 8080 architecture consists of a register array, address buffer, ALU, instruction register, and data bus buffer/latch. The register array contains eight 8-bit registers—two of which are temporary registers—the stack pointer, the program counter, and an incrementer/decrementer address latch. The last three in the register array are 16-bits. Data is sent from the register array to the 16-bit address buffer. The ALU receives data from an accumulator, which passes through an accumulator latch first, and a separate temporary register. Both data sources are 8-bits. A 5-bit flip-flop flag unit sends a signal to and receives a signal from the ALU. The ALU also receives and sends signals to and from a decimal adjust unit. The instruction register, an 8-bit register, sends data through a decoder unit before sending it to the timing and control unit. The data bus buffer/latch sends 8-bits to the internal data bus, which is connected to the accumulator, temporary register, flip-flop flag unit, intstruction register, and a multiplexer that is connected to the register array. All of these, except for the address buffer, receive signals from the timing and control unit.

**MIPS**

The MIPS data path unit consists of Instruction Memory, three ALUs, Register File, Control Unit (3 in, 8 out), a Sign Extend, Data Memory, and a Zero Extend. Instruction memory takes in the PC and outputs an instruction. The instruction is then fed to the control unit, register file, sign extend, and zero extend. The control unit is in control of memory to registry, write, branch, ALU Control, ALU source, Register destination, branch choice, and register write. At the end is the data memory which takes in write data, an ALU result that consists of the ALU control signal.

**ARM**

The main components of an ARM processor consist of the Register, Multiplier, Barrel Shifter, Arithmetic Logic Unit, and a Control Unit. In the design that was analyzed, the ARM processor consisted of 16 32-bit registers. Unlike other processors that have been looked at, ARM has each register of the same size. There is only one ALU and it takes a value from the register file and a value from the barrel shifter. There is also a status register which is affected by the register file, the ALU, and the Multiplier. There is also an instruction register that affects both the control unit and the barrel shifter. Data that comes in affects the instruction register.

**Nvidia Fermi**