Lecture Notes for 21th January 2020

SISD - Single instruction single data
App. - Vector addition as in image processing, matrix multiplication

SIMD Single Instruction Multiple Data

MISD - Multiple Instruction Single data
App. - DSP, Systolic array

MIMD Multiple Instruction multiple data
Things happening concurrently
Application in Multiprocessor

Timeline of super computer
1951 – 74: Illiac 1 – 4
Illiac 1 – 2800 vacum tubes, wt. 5 tons
Illiac 4 – 256 processor, NASA Ames
1955: IBM 704 Designed by Gene Amdahl
First machine to have floating point unit
5KFLOPS(Floating point operation per second)

1959: IBM Stretch – Super computer for LANL
1964: CDC 6600 - First successful supercomputer
60 bit CPU 10 peripheral processing units PPUs
Super scalar
1966: Flynn's Paper
1967: IBM 360 Mode 91 – Gene Amdahl
Amdahl law
1971: Intel first single chip CPU 4004
Texas Instruments – Advanced Scientific Computer(ASC)
Vector Instructions(SIMD)
1972: Harold Stone
Perfect shuffle network – how to design network
Butterfly machine (build BBN) for FFT, convolution
Goodyear STARAN – 4 x 256 1- bit elements
1974: Jack Dennis at MIT – dataflow computer
Burton Smith – HEP Denector
Illiac 4 becomes operational at NASA Ames
Intel iAPX - 432 multiprocessor
1976: Cray -1 became powerhouse of super computer – deigned in LANL
Fujitsu FACOM – 230 vector processor
1978: CDC Cyber 203
1979: Josh Fisher
Multiflow – VLIW
John Cocke IBM 801 – RISC
Inmos transputer
1980: Univ. Rice – Ken Kennedy – parallel Fortan
1981: DEC VAX 11/ 780 – Main frame killer(General purpose)
Caltech Hyper computer
BBN Butterfly – 68K CPU
NYU Ultracomputer shared multiprocessor

Connection Machine – CM1

1982: Cray X- MP
Fujitsu VP- 200 500MFLOPS

1983: NEC SX1 vector machine
Thinking machines – connection machines
Sequent – x86 shared memory multiprocessors

1984: Cray X-MP achieve 21MFLOPS
Multiflow and Cydrome – VLIW

1985: Fujitsu VP-400
IBM 3090 – vector processor
nCube-10 hybercube
IBM RP3 – based on the NYU Ultracomputer

1986: CM1 65K single bit CPUs- hybercube
Cray X-MP 4 CPU 713 MFLOPS

1987: NEC SX-1 885MFLOPS
Cydra5- VLIW

1988: InMOS T800
Cydrome closes
Cray – Y- MP 8 CPU -2.1GFLOPS
Gustafson – argues problems with the Amdahls law
Berkerley – RAID

1989: CDC Shutdown – ETA failure
BBN 88K

1990; Forward
Shared memory dominate HPC

Material to read
https://ieeexplore.ieee.org/document/7780106: Emulating floating using fixed point