



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (PO), Coimbatore – 641 107

Accredited by NAAC-UGC with 'A' Grade

Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai

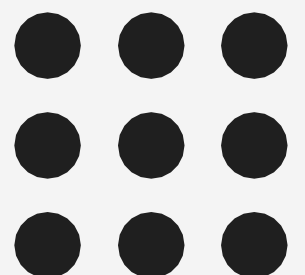
DEPARTMENT OF ECE

COURSE NAME: 19IT301 COMPUTER ORGANIZATION AND ARCHITECTURE

II YEAR/ III SEM

Unit 1 : BASIC STRUCTURE OF COMPUTERS Topic 8:

Case study- RISC and CISC Architecture

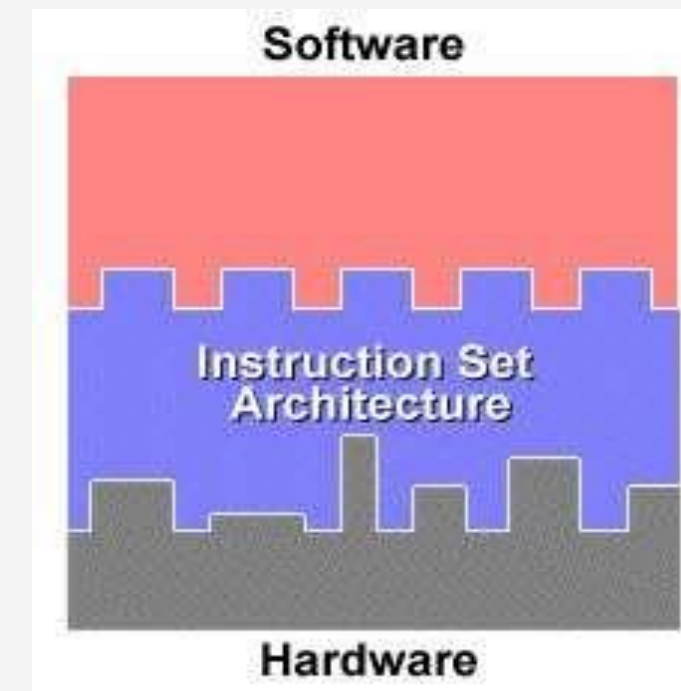


9/30/2023

K.Sangeetha/AP/ECE / SNSCE / III Sem / COA / UNIT - 1

Instruction Set Architecture (ISA)

- Instruction set or instruction set architecture (ISA) is the structure of the computer that provides commands to guide the computer for processing data manipulation.
- Instruction set consists of
 - ✓ instructions
 - ✓ addressing modes
 - ✓ registers
 - ✓ interrupt
 - ✓ exception handling
 - ✓ memory architecture



Instruction set of Processor

RISC

RISC or Reduced Instruction Set Computer is a type of microprocessor architecture that utilizes a small, highly-optimized set of instructions for processing computations.

- It is also called as LOAD/STORE architecture
 - Divides instruction into memory access and ALU operations
- The IBM was the first company to define the RISC architecture in the 1970s.
- This research was further developed by the universities of Berkeley and Stanford to give basic architectural models.



A Sun UltraSPARC,
a RISC microprocessor



Characteristic/features of RISC processors

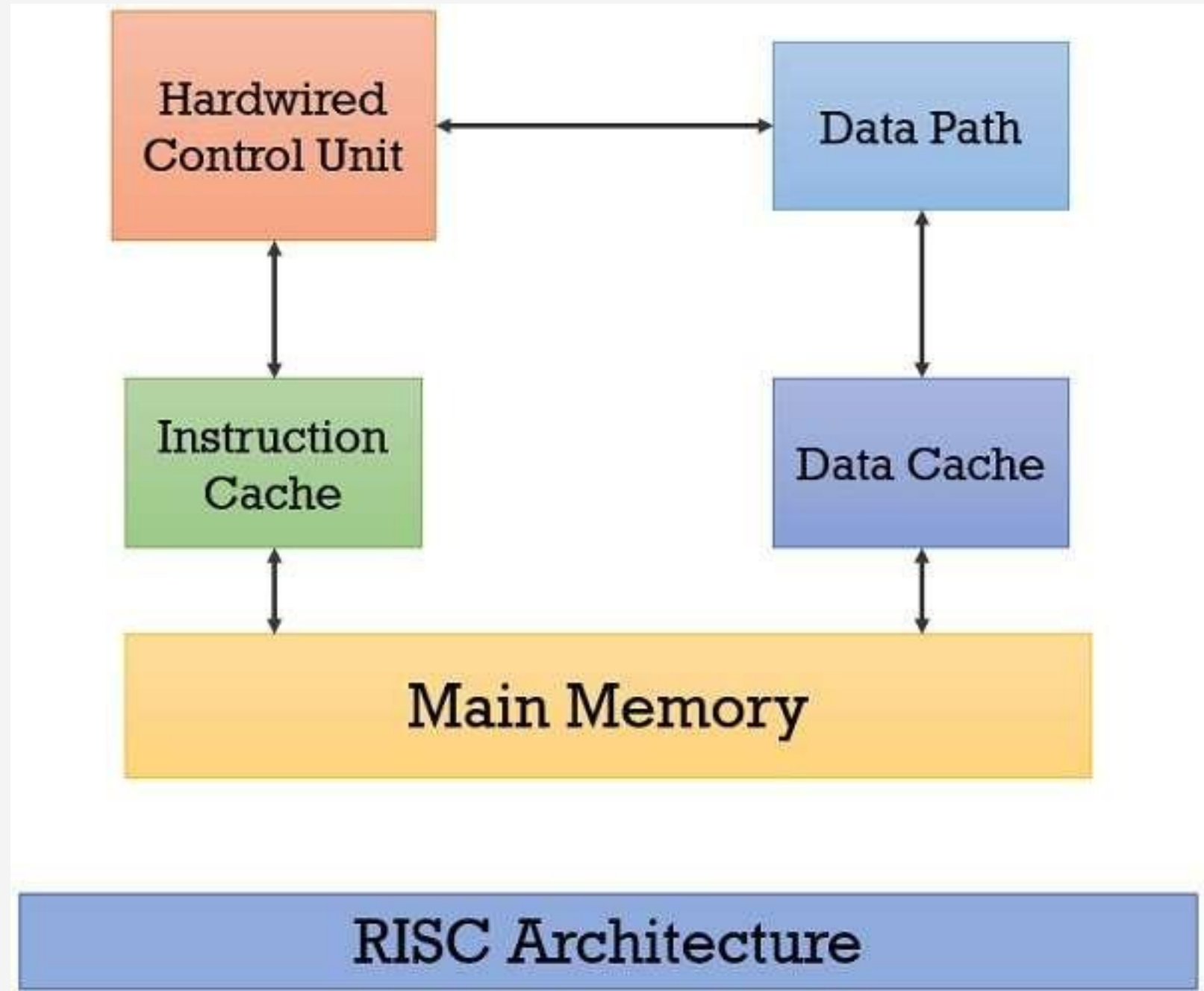
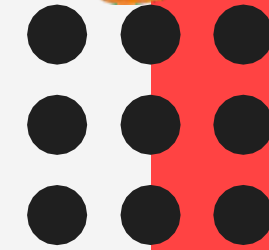


- Low number of clock cycles per instruction (CPI)
- Large number of registers(32 or more)
- Instruction pipeline
- Simple addressing modes



9/30/2023

RISC Processor Architecture

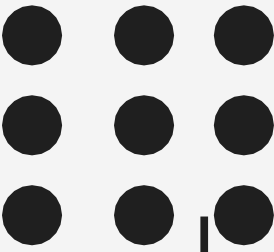


- Hardwired is a circuitry approach generates the control signals to fetch and execute instructions.

Examples: MIPS, PowerPC, SUN SPARC, Alpha, RISC-V, ARM(Advanced RISC Machine)



Advantages of RISC Processor



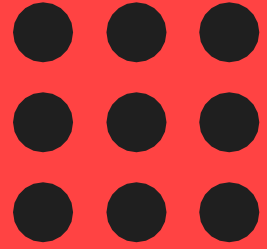
- RISC instructions are simpler machine instruction
- RISC instructions are hardwired to fasten the execution
- Very less number of instruction formats (less than four), a few number of instructions (around 150) and a few addressing modes (less than four) are needed
- Register based instructions
- Less design complexity



Disadvantages of RISC Processor



- The machine instructions are hardwired in RISC so, it would cost if any instruction needs modification
- RISC instructions do not allow direct memory to memory transfer, it requires Load and Store instructions to do so.
- RISC instruction size is reduced but more instructions are required to perform an operation



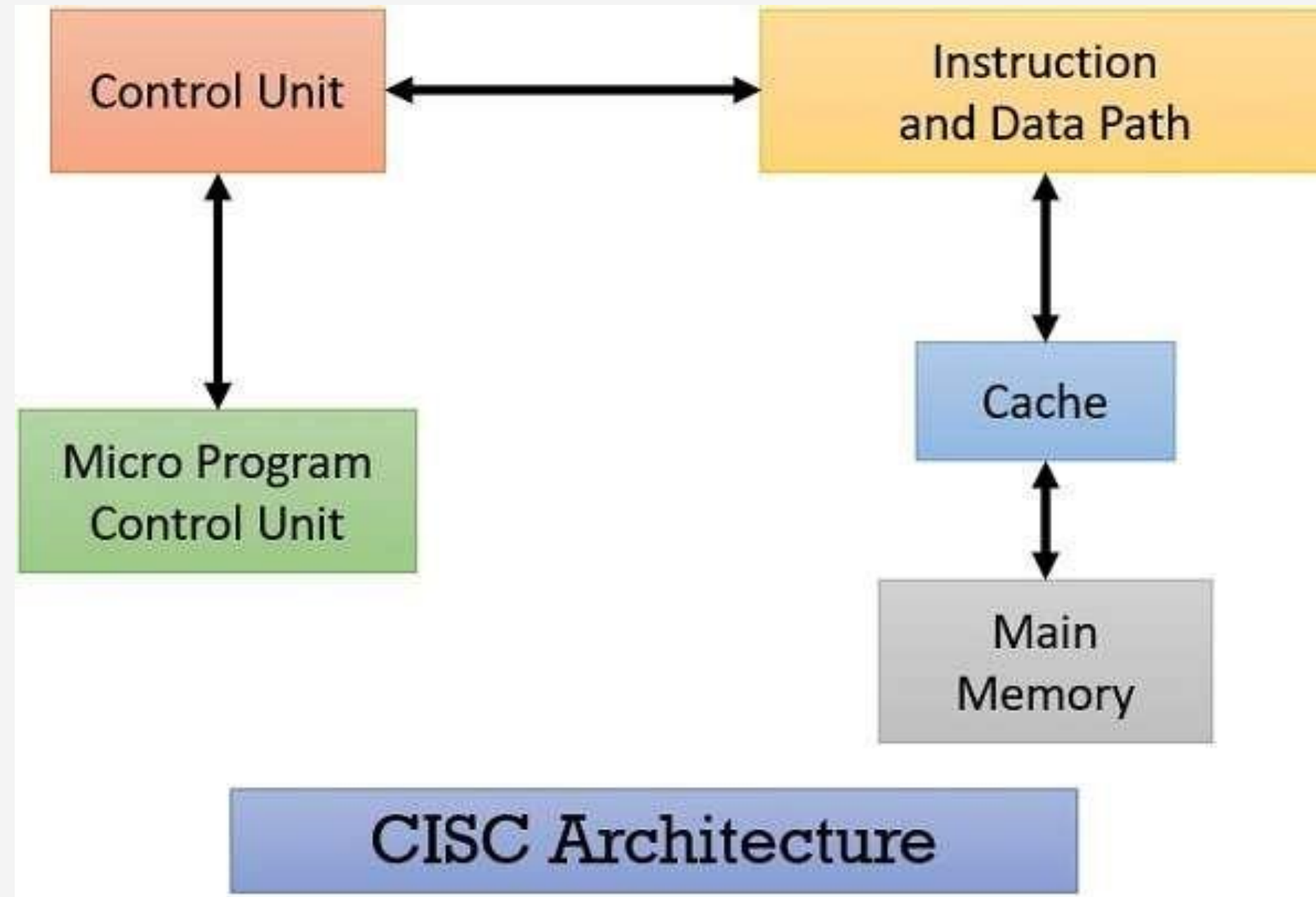
CISC



- CISC(Complex Instruction Set Computer) processor architecture completes the task by reducing the number of instructions in a program
- Since program/software is simplified, hardware is complex to perform complex tasks

Features of CISC Architecture

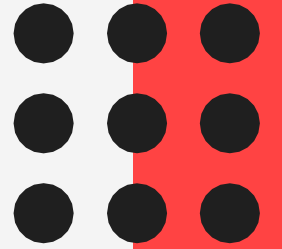
- More number of predefined instructions which makes high level languages easy to design and implement.
- Less number of registers and more number of addressing modes, generally 5 to 20.
- Takes varying cycle time for execution of instructions – multi-clock cycles.
- Complex instruction set makesthe pipelining technique difficult.
- CISC consists generally from 100 to 250 instructions



Microprogram control unit uses a series of microinstructions of the microprogram (instructions are like small programs) and generate the control signals.

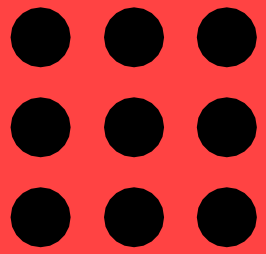


Example



Examples of CISC Processors are:

IBM 370/168, VAX 11/780, Intel 80486.



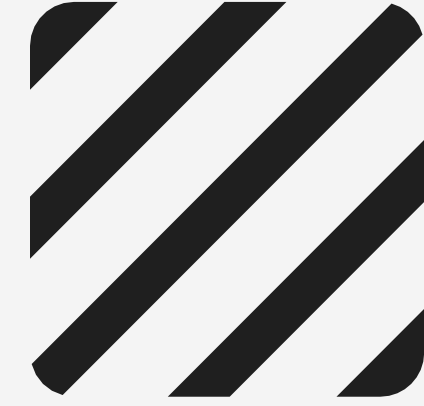
Advantages



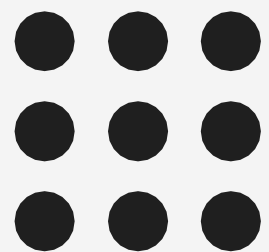
- The code size is comparatively shorter which minimizes the memory requirement.
- Execution of a single instruction accomplishes several low-level tasks.
- Complex addressing mode makes the memory access flexible.
- CISC instruction can directly access memory locations.

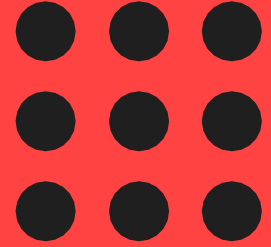


Disadvantages of CISC



- Though the code size is minimized but it **requires several clock cycles** to execute a single instruction
- The hardware structure needs to be more complex to simplify software implementation.





RISC vs CISC



- To perform a complex task, multiple small instructions are used together in RISC, whereas only a few instructions are required to do the same task using CISC – as it is capable of performing complex tasks
- CISC is typically used for computers while RISC is used for smartphones, tablets and other electronic devices.





Assessment



1. The computer architecture aimed at reducing the time of execution of instructions is _____

- a) CISC
- b) RISC
- c) ISA
- d) IANA

2. The RISC processor has a more complicated design than CISC.

- a) True
- b) False



Assessment



3. Pipe-lining is a unique feature of _____

- a) RISC
- b) CISC
- c) ISA
- d) IANA

4. Out of the following which is not a CISC machine.

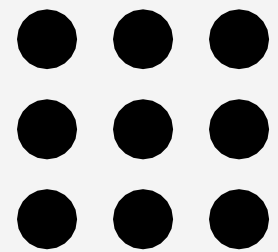
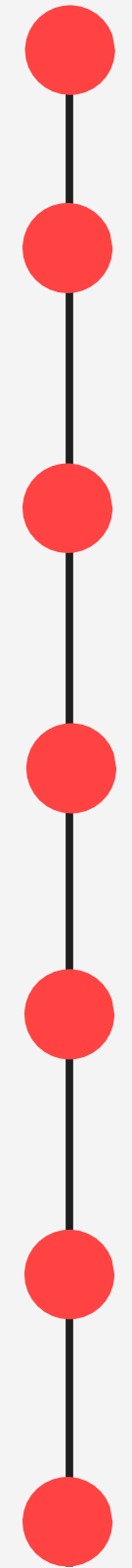
- a) IBM 370/168
- b) VAX 11/780
- c) Intel 80486
- d) Motorola A567



Answers



1. b
2. b
3. a
4. d





Thank You