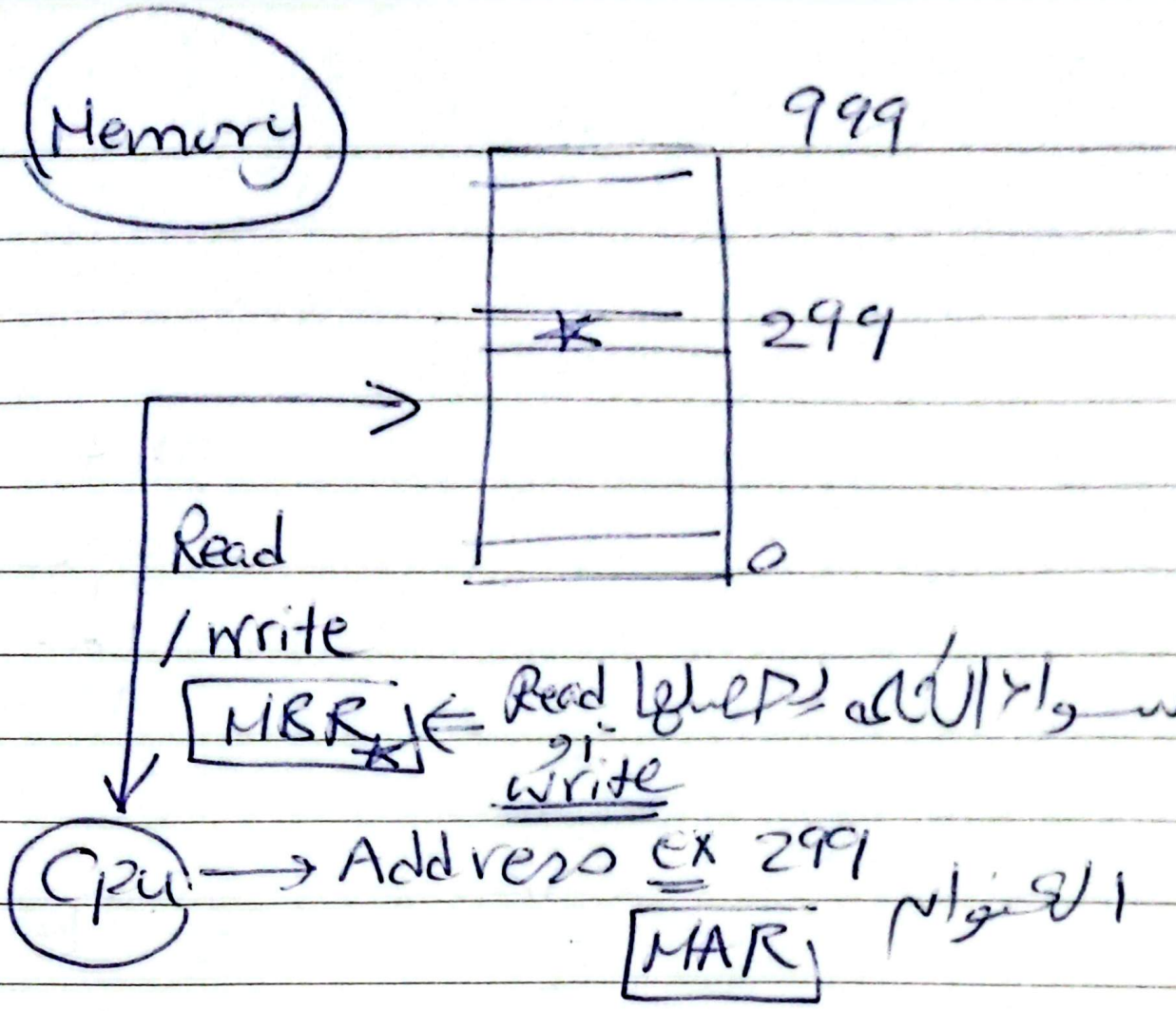
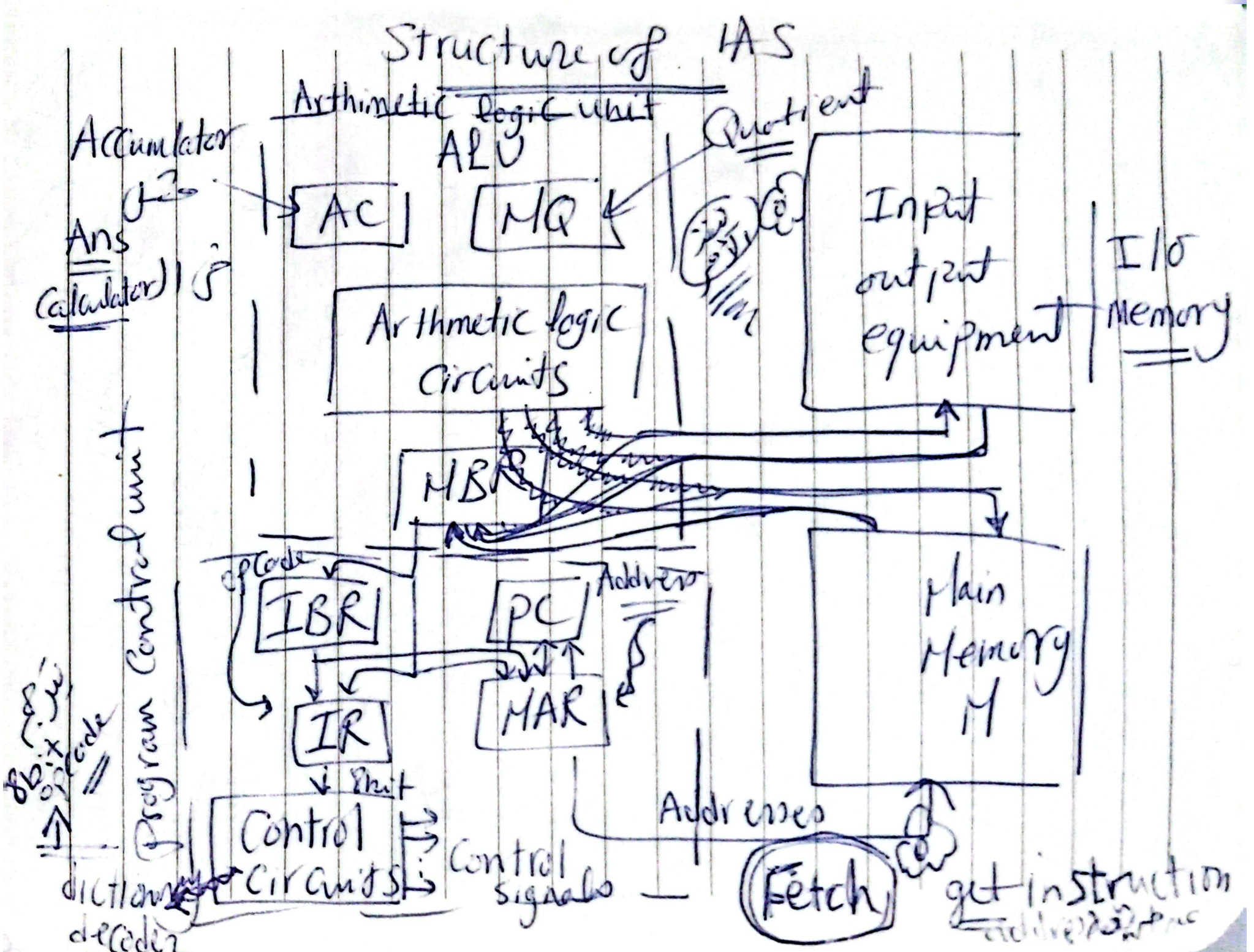


MBR ← Read أو write

MAR: Memory Address Register

MBR: Memory Buffer Register

Content


Structure of IAS
Arithmetic logic unit
ALU
Accumulator
Ans
Calculator
AC
MQ
Quotient
Input output equipment
I/O
Memory
Arithmetic logic circuits
MBR
Program Control unit
IBR
PC
Address
Main Memory M
IR
MAR
Control Circuits
Control signals
Addresses
Fetch
get instruction

memory. الذاكرة بالرام حتواها في ال
Instruction Register

IR: Instruction Register
opcode يكون به

ex 1100 0111

Control Circuit
حتواه الذاكرة يفتحه ويشوفه

Control Signals الـ ويطلع
لكل Execution

PC : Program Counter
يحتوي على عنوان الأمر
الذي عليه الدور في التنفيذ

Note: Fetch get instruction address
(الذي في) PC ← 1
Program Control Unit
ولكن instruction نشغل
عشان نشوف الأول

AC + Multiple Quotient MQ

Arithmetic logic circuit

MBR

Memory word

M I/O

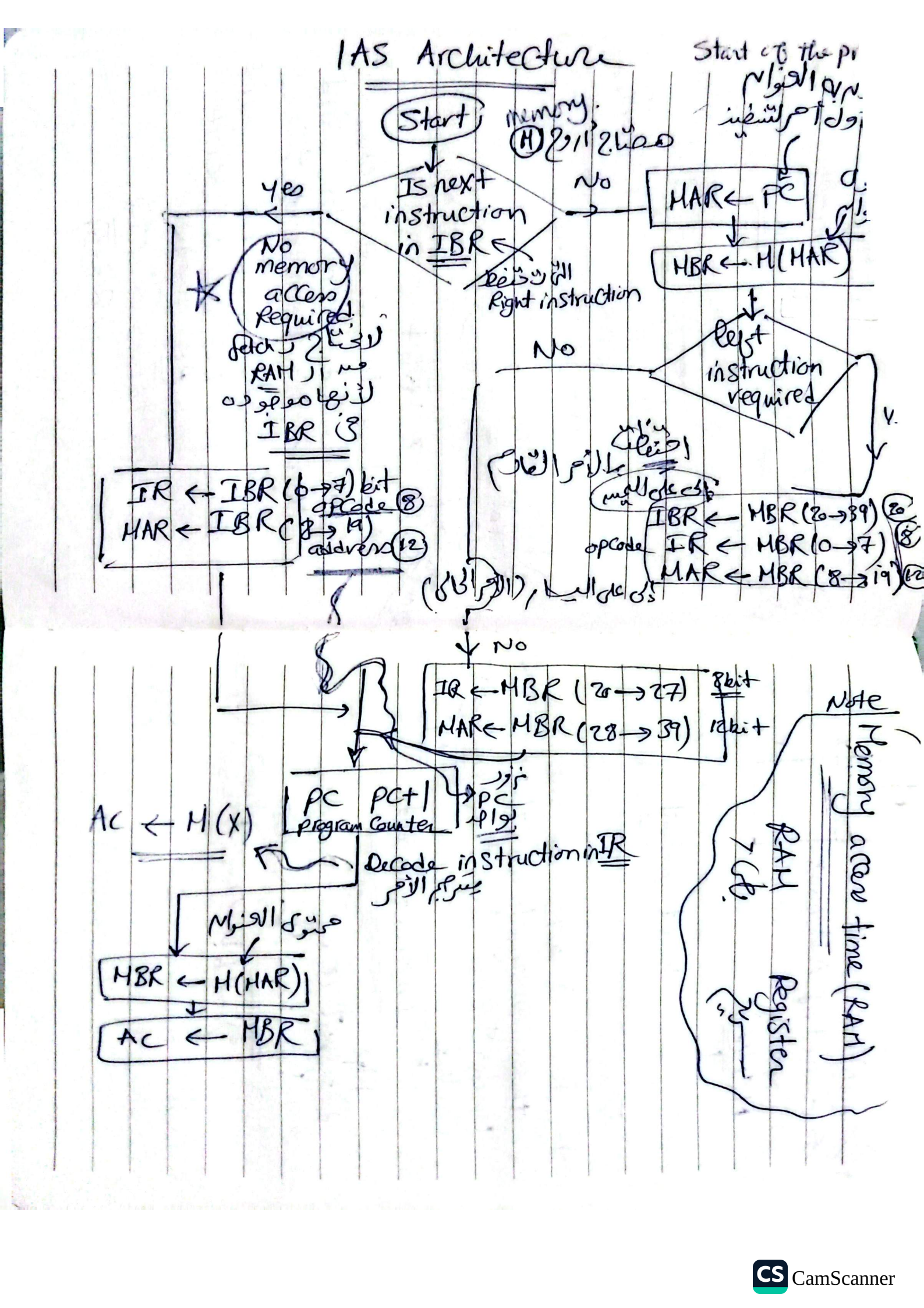
Example

40 bit X 40 bit

if we have to no,s each one represented by number word 40 bit the Result of thier multiplication is 80 bit no, word so we put Most significant 40 bit in AC (L.HS)

& least 40 bits in MQ (R.H.S)

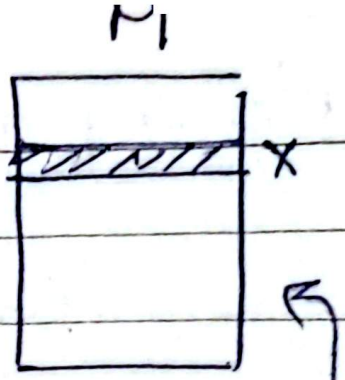
IAS Architecture



Note

m(X)

* content of Address X



M (MAR)

to get content

* The 8 bit opCode those instructions that understood by the processor called Mp

Instruction Set

Mp

Datasheet

hardware/k. api's

Instruction Set

ex Processor Set is 21 instruction classified into Catogrize.

* Data transfer
  ex MOV (move)
* Arthimetic & logic
  ex ADD, ADC, NOT, AND, OR
* Bit manipulation, add with Carry
  Complemental Bit ← CA, SB → SetBit ex
* loops and Jumps
  ex jump
* String

* Subroutines & interupts
  ex ↓ Function, interupt ↓ Service Routine
* Control
  ex Branch.

Note: difference Microcontroller & Microprocessor later

Mp Basic operation

* **Fetch** Get
take
instruction from memory → place it in the CPU in control unit

* **Decode** لو احتاج معلومات أكثر من الـ memory
يترجم الأمر
لترجمة الأمر هيعمل **fetch** مرة تانية وبعد ذلك
يزود الـ **PC** بعد الترجمة

* **Execute** Results Execution of
ينفذ الأمر
يعود على
Register Memory

⇐ بعض الأحيان نعتبر الـ
fetch والـ
Decode خطوة واحدة

Lecture 5

Computer Evolution Part (4)

Review ENIAC, Von Neuman - Registers. "UNIVAC (I) (II) universal automatic computer"

In this Lecture.

- Commercial Computers
- Transistors
- Integrated Circuits
- Moore's law
- Microprocessor

faster memory

UNIVAC ... IBM ...

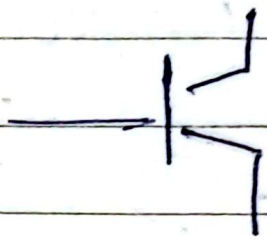
Vaccum tubes

Transistors ← ... switch

transistors

اختراعها سنة 1947 في معامل Bell
الجيل الثاني من الكمبيوتر

Replaced vacuum tubes because it's



→ Smaller
→ Cheaper
→ less heat dissipation
→ Solid State device.
→ Made from Silicon (Sand)

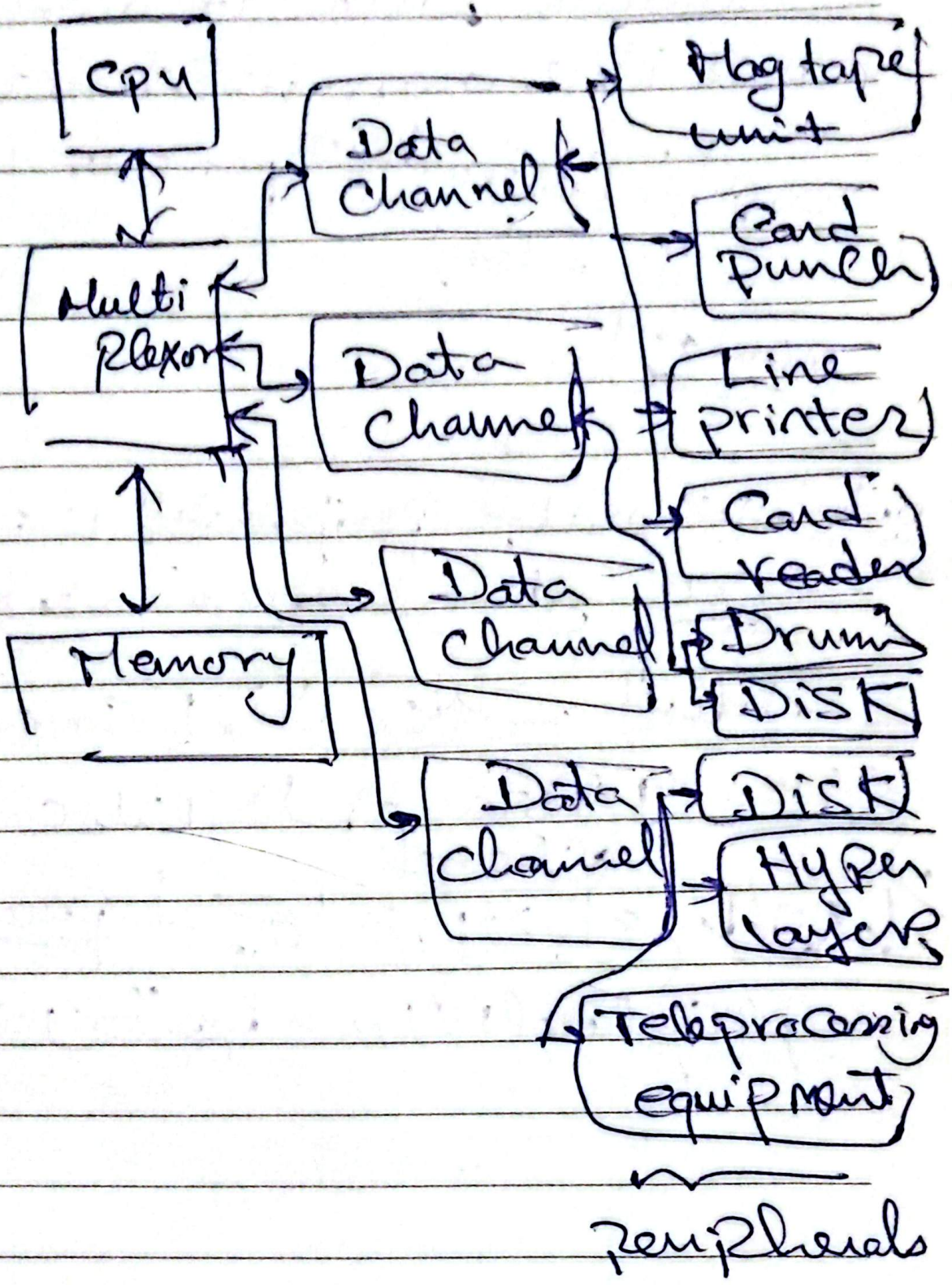
Transistor based computers
(Second generation machines)

Ex IBM 7000

من أشهر أجهزة الجيل الثاني

IBM 7094

IBM 7094 Configuration



Data channel

is an independent I/O module with it own processor and it's own instruction set

لها instruction processor لها
بها في ال
memory

← هذا الـ peripherals بتكون ميكانيكية
وظيفته وصل الـ CPU
لل Computer انتبه، بتلاقي العمليات
لذلك عملنا الـ Data Channel لتنظم
الـ processor لديها في التعامل بالوقت
الي بتتعامل هذا الـ peripherals

- in a Computer System with such devices, the CPU doesn't execute detailed I/O instructions
- Such instructions are stored in a main memory to be executed by special purpose processor in the data channel itself
- the CPU initiates an i/o transfer by sending control signal to the data channel, instructing it to execute a sequale of instructions in memory
- The data channel performs its task independtly of the CPU and signals the CPU when the operation is complete
- This arrangement relieves the CPU of a considerable processing burden

✓ Multiplexer وصول الدخول

memory على
Datachannel و CPU الـ
memory الـ

* Microelectronics

→ Small electronics
→ a Computer is made up of gates
logical gates — or gate
based on transistors
memory cells
↓
Flip flops
bits

and interconnections

→ These can be manufactured on a semiconductor
→ eg Silicon wafer

IC's

Small Scale integrated Circuit (SSI)

Complexity of the ICs

the capacity of the IC

how many transistors can exist in one IC

or device

generations of computer

ex

(1) In 1965 SSI can contains 100 devices or a chip

↑ transistor

(2) In 1971 Medium Scale Integrat

100 → 3000 device

(3) 1977 large Scale

3000 → 100,000

(4) VLSI 1978 Very large Scale

100,000 → 100,000

ULSI ultra large Scale Integration

over 100,000,000 devices on chip

IC Complexity classification

1. Small Scale Integrated Circuit (SSI)
   - basic logic gates & OR, Flip Flop
   - contains 10 gates per chip
2. Medium (MSI)
   - 10 → 100 gates
   - ex encoder, decoder, 7 Segment, counter, Multiplexer
3. Large Scale (LSI)
   - 100 → 1000 - including large memories
   - مثل الثلاجة & keyboard الكمبيوتر & video & elevator

(4) very large
10,000 → 100,000

(5) ultra large
100,000 → 100,000,000

large Single chip Computer
OR
micro processor

Moore's Law

→ Gordon Moore Cofounder of intel.

(IPI) عدد الترانزستورات transistors على شريحة

electronics, noise, bandwidth

in fabrication not easy to increase transistors on the chip

(IPI) chip

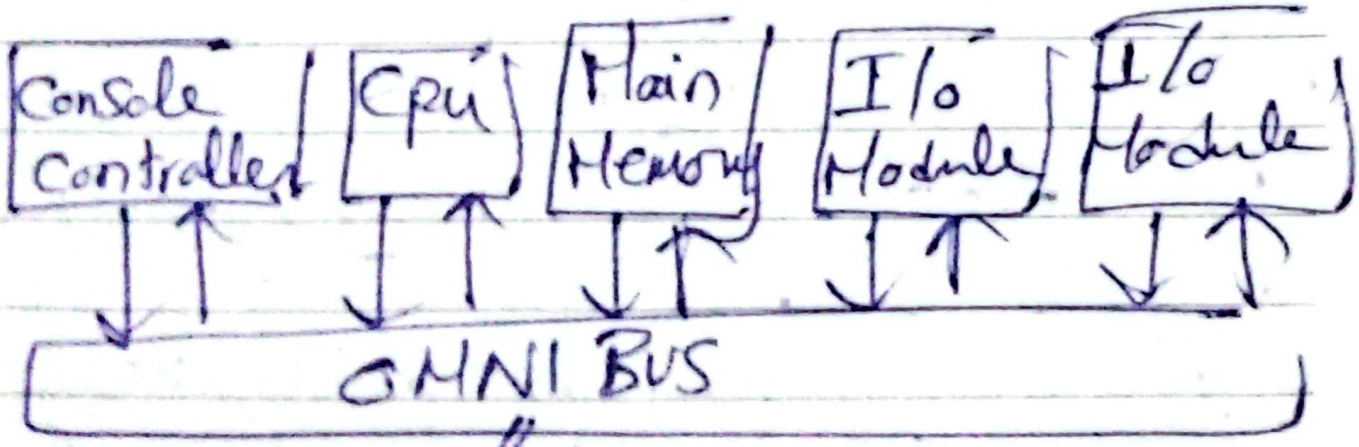
IBM

كل اللي Computers جاي هتزيد ع increasing

- Speed
- memory Size
- no. of I/O ports

DEC PDP-8 | 1964

- First mini Computer
- didn't need AC room
- Small enough



11 level Computer

CamScanner

Semi Conductor Memory

لابد من تطور الـ memory

processor وغير transistor

لابد من حواكبة الـ memory

وإلا حدث processor الـ مع

الـ memory

Intel

→ 1971 في

4004 microprocessor أول

الـ cpu كل موجود Single Chip على

processor → 4bit ALU

Microprocessor

(VLSI) Very large Scale Integrated chip

contains programmable electronic components

classification → microprocessors

no. of bits that their ALU can work at a time (الواحد) (في الثانية) clock (ي)

ex 4 bit ALU

↓

8080 (معالج)

1974

note lectures (5) pipelining + cloud computing

lecture (6) embeded systems

50

The evolution of Intel x86 architecture

⇓

we have to understand

CICs RISCs

First

⇓

Pipelining + next lecture