Computer Architecture and Organization

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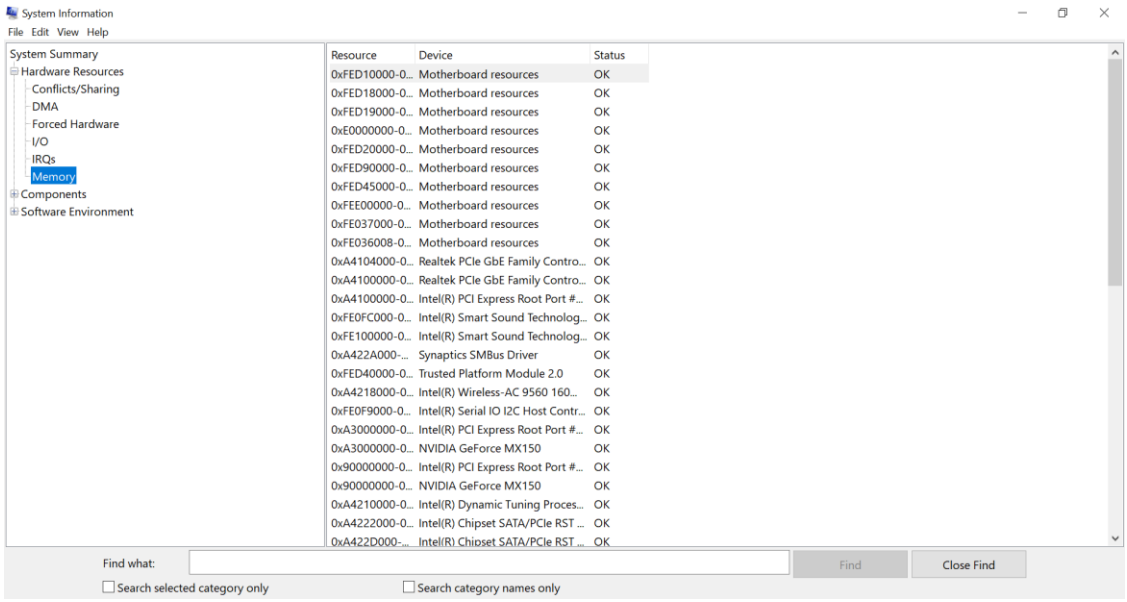
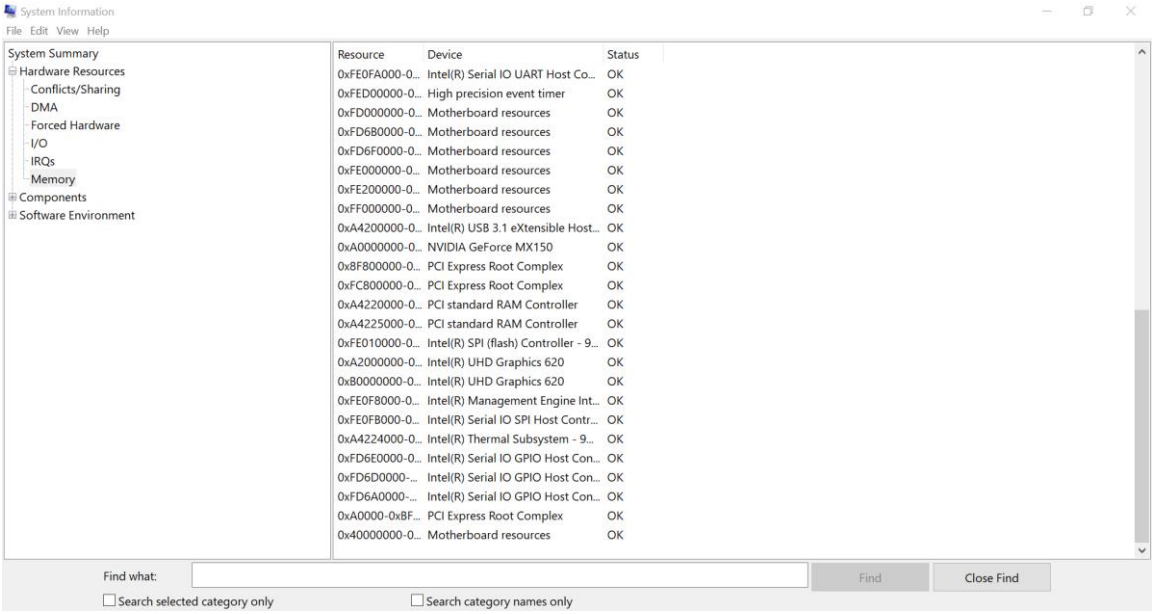
Memory organization details

The allotted range of physical address of specific functions of my System is displayed below. The “0x” in the beginning of every address symbolises that it is in Hexadecimal format. Totally there are 8 digits in each Hexadecimal address. i.e. it’s 32-bit address

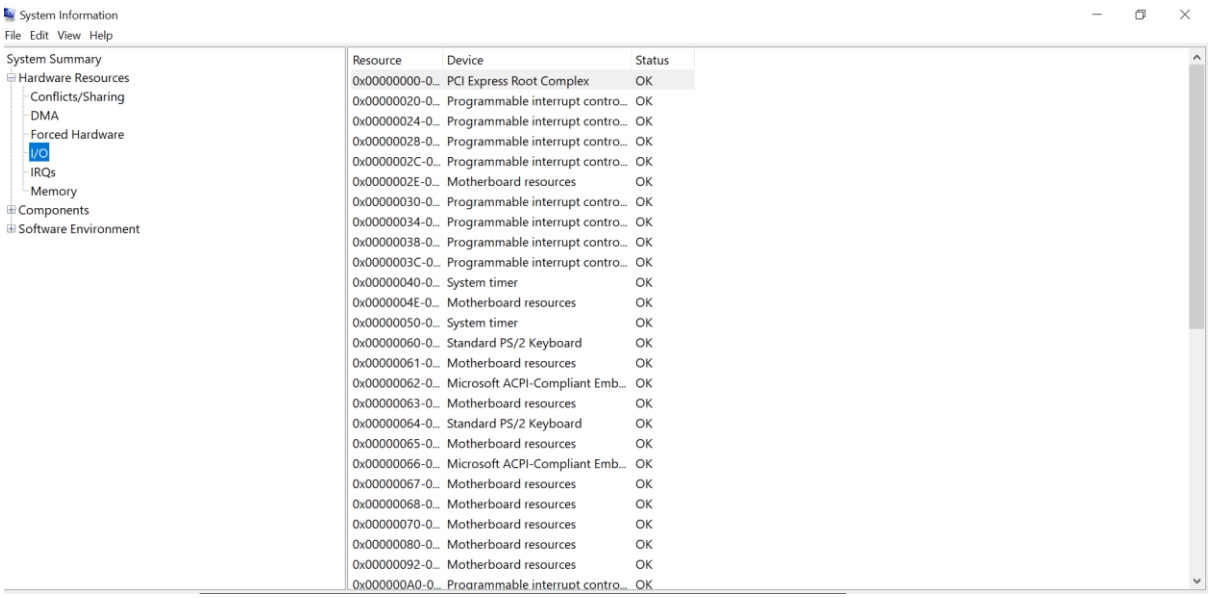


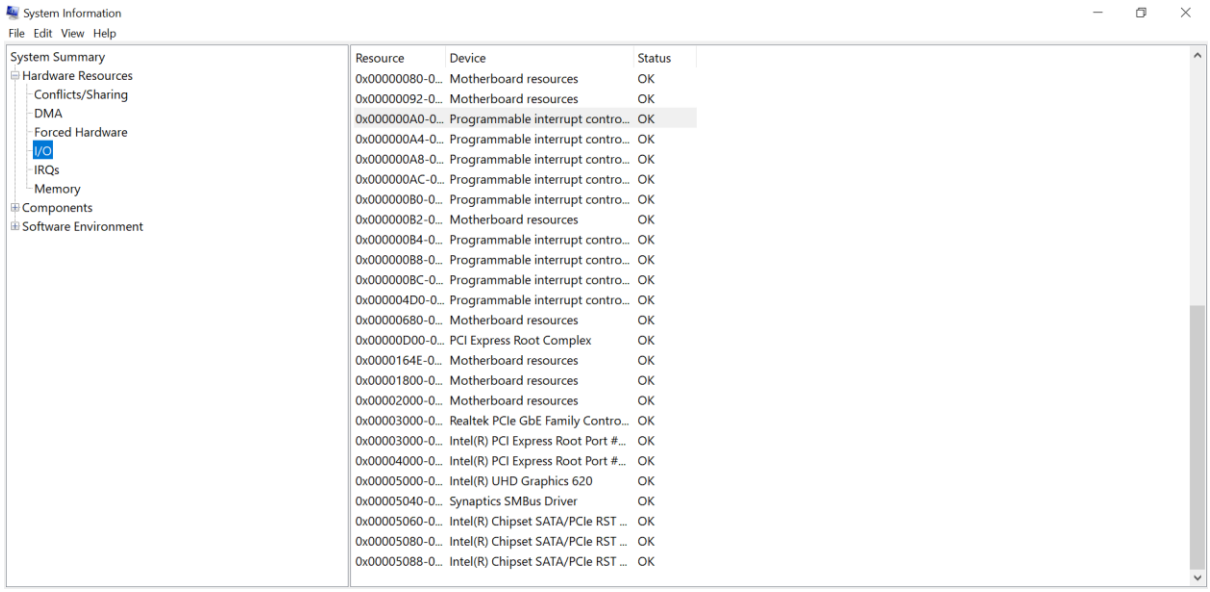


I/O interface

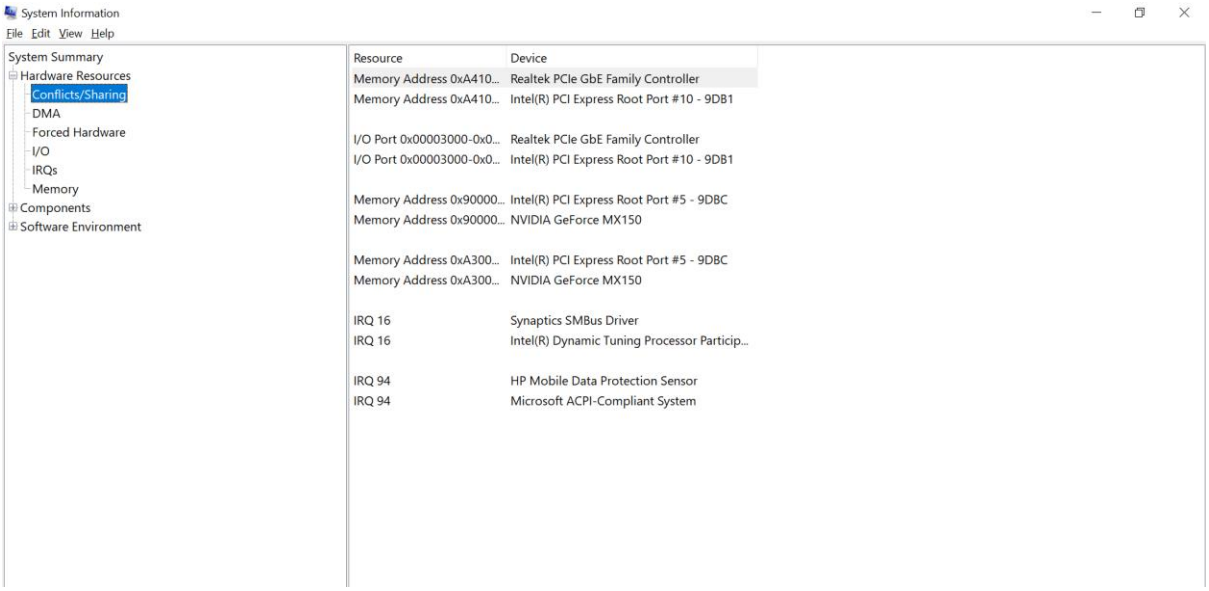
Processor → i5 8th gen

System → Hp Pavilion 14 ce1001tx

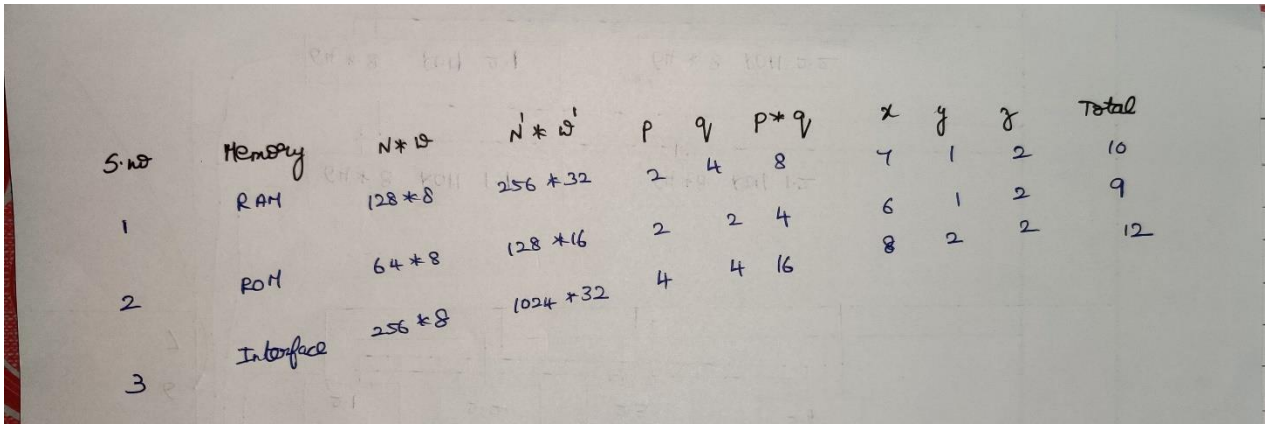




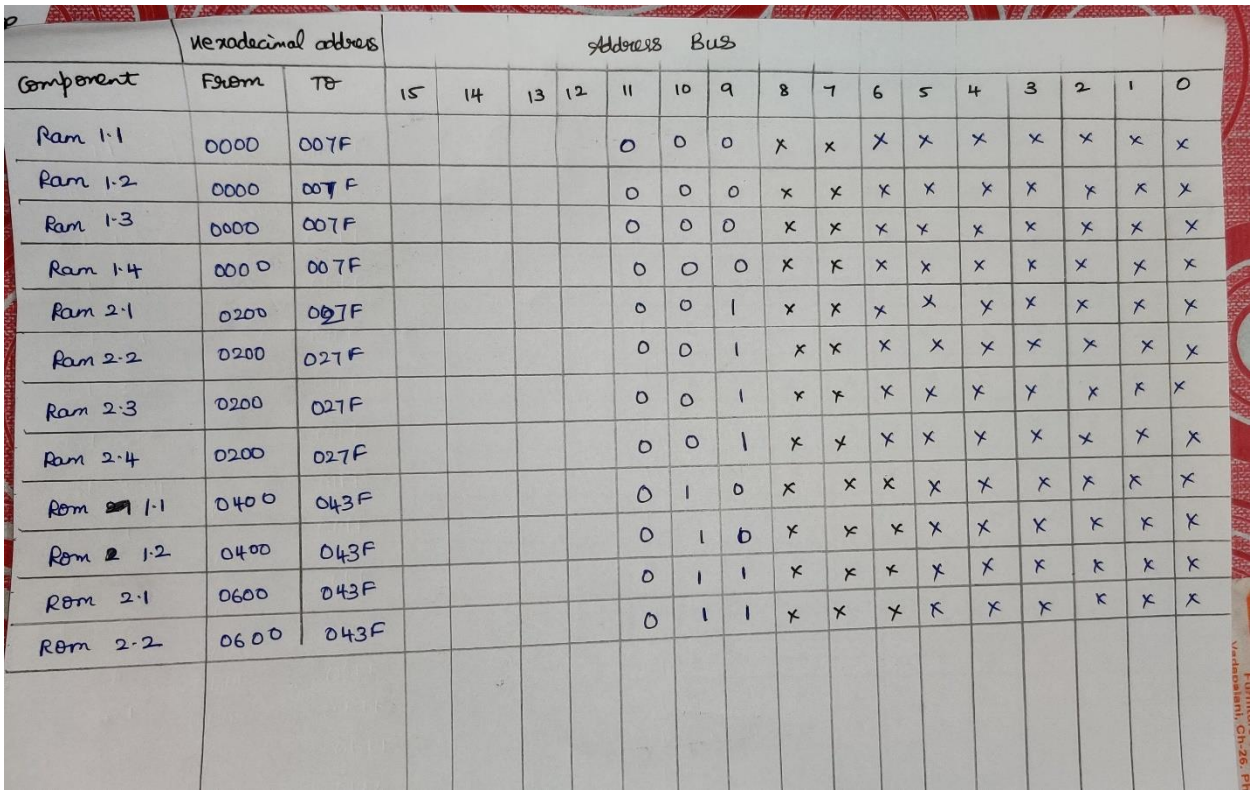
Conflicts and Sharing Memory



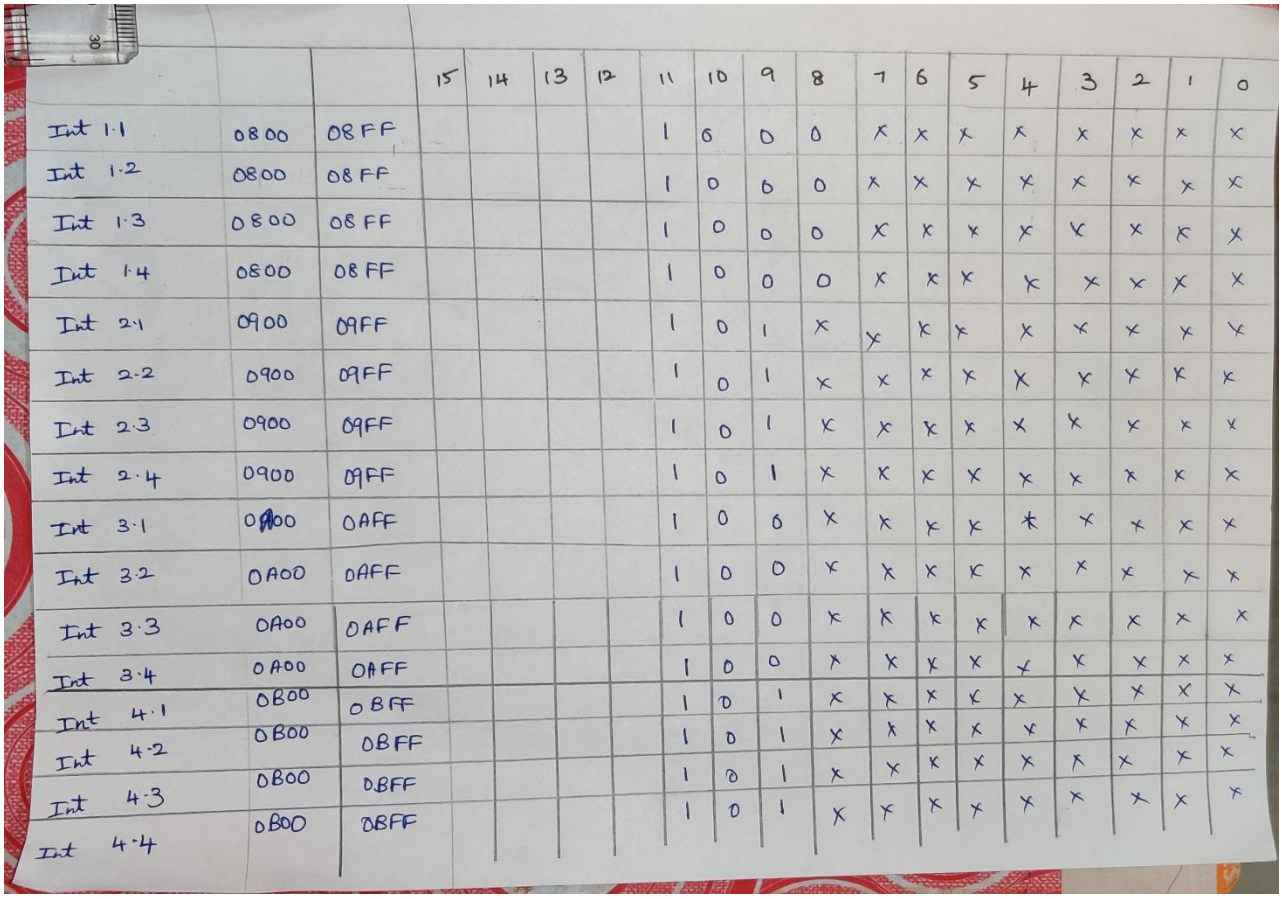
Memory design problem



S.No	Memory	N*B	N'*B'	p	q	p*q	x	y	z	Total
1	RAM	128*8	256*32	2	4	8	4	1	2	10
2	ROM	64*8	128*16	2	2	4	6	1	2	9
3	Interface	256*8	1024*32	4	4	16	8	2	2	12



Component	Hexadecimal address From	To	Address Bus 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Ram 1.1	0000	007F					0	0	0	x	x	x	x	x	x	x	x	x
Ram 1.2	0000	007F					0	0	0	x	x	x	x	x	x	x	x	x
Ram 1.3	0000	007F					0	0	0	x	x	x	x	x	x	x	x	x
Ram 1.4	0000	007F					0	0	0	x	x	x	x	x	x	x	x	x
Ram 2.1	0200	027F					0	0	1	x	x	x	x	x	x	x	x	x
Ram 2.2	0200	027F					0	0	1	x	x	x	x	x	x	x	x	x
Ram 2.3	0200	027F					0	0	1	x	x	x	x	x	x	x	x	x
Ram 2.4	0200	027F					0	0	1	x	x	x	x	x	x	x	x	x
Rom 1.1	0400	043F					0	1	0	x	x	x	x	x	x	x	x	x
Rom 1.2	0400	043F					0	1	0	x	x	x	x	x	x	x	x	x
Rom 2.1	0600	043F					0	1	1	x	x	x	x	x	x	x	x	x
Rom 2.2	0600	043F					0	1	1	x	x	x	x	x	x	x	x	x



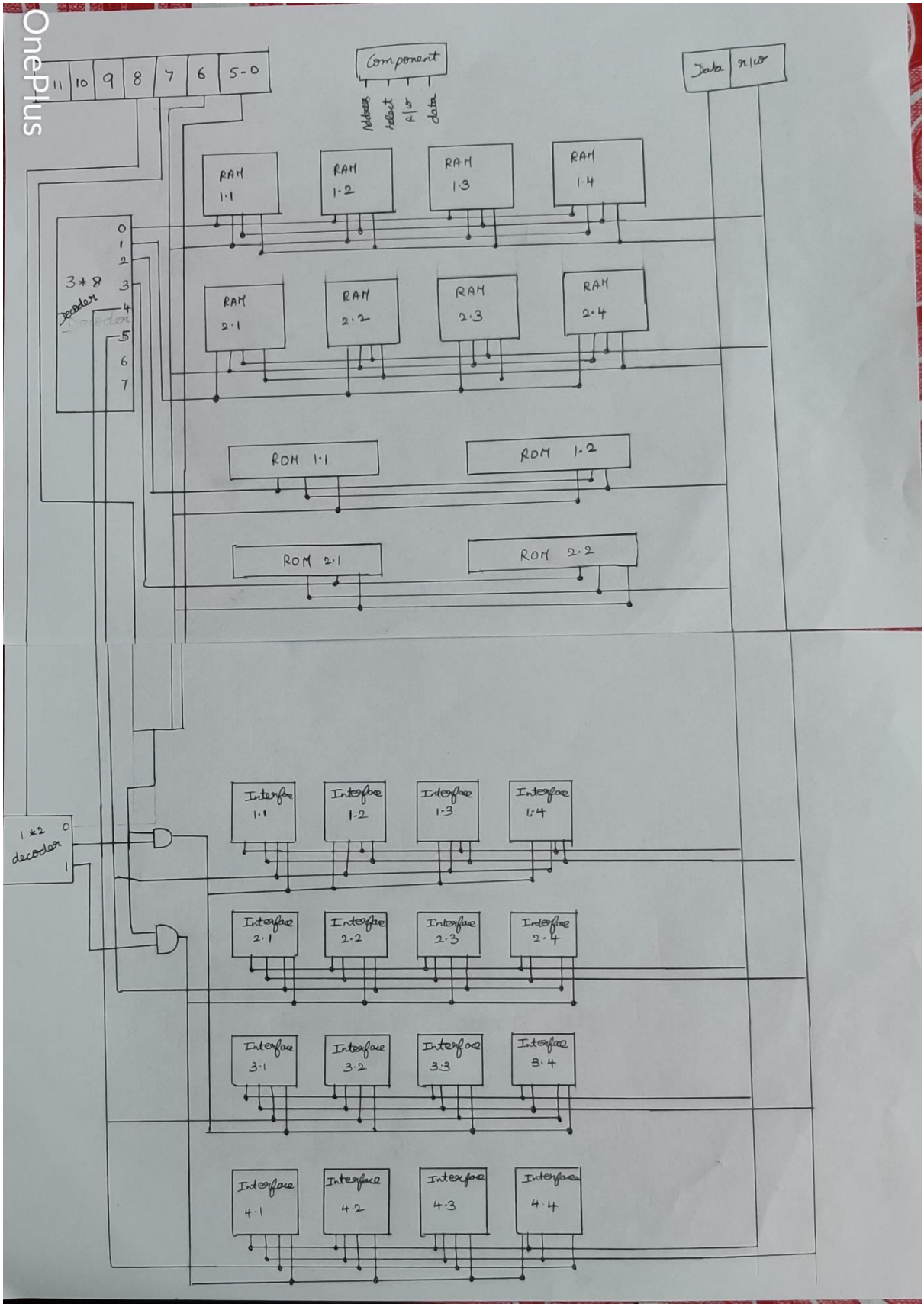
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Int 1.1	0800	08FF					1	0	0	0	x	x	x	x	x	x	x	x
Int 1.2	0800	08FF					1	0	0	0	x	x	x	x	x	x	x	x
Int 1.3	0800	08FF					1	0	0	0	x	x	x	x	x	x	x	x
Int 1.4	0800	08FF					1	0	0	0	x	x	x	x	x	x	x	x
Int 2.1	0900	09FF					1	0	1	x	x	x	x	x	x	x	x	x
Int 2.2	0900	09FF					1	0	1	x	x	x	x	x	x	x	x	x
Int 2.3	0900	09FF					1	0	1	x	x	x	x	x	x	x	x	x
Int 2.4	0900	09FF					1	0	1	x	x	x	x	x	x	x	x	x
Int 3.1	0A00	0AFF					1	0	0	x	x	x	x	x	x	x	x	x
Int 3.2	0A00	0AFF					1	0	0	x	x	x	x	x	x	x	x	x
Int 3.3	0A00	0AFF					1	0	0	x	x	x	x	x	x	x	x	x
Int 3.4	0A00	0AFF					1	0	0	x	x	x	x	x	x	x	x	x
Int 4.1	0B00	0BFF					1	0	1	x	x	x	x	x	x	x	x	x
Int 4.2	0B00	0BFF					1	0	1	x	x	x	x	x	x	x	x	x
Int 4.3	0B00	0BFF					1	0	1	x	x	x	x	x	x	x	x	x
Int 4.4	0B00	0BFF					1	0	1	x	x	x	x	x	x	x	x	x

BIOS → Basic Input/Output System

The Basic Input Output System, or BIOS, is a very small piece of code contained on a chip on your system board. When you start your computer, BIOS is the first software that runs. It identifies your computer's hardware, configures it, tests it, and connects it to the operating system for further instruction. This is called the boot process.

Entering the BIOS setup utility allows you to change the boot process order as well as a wide variety of hardware settings. It is not recommended for an inexperienced user to change settings in the BIOS unless they are being instructed to do so by a trusted source.

Over time, limitations in BIOS led to the creation of a new firmware interface called Unified Extensible Firmware Interface, or UEFI. UEFI is very similar to BIOS, but has some advantages. It can boot from disks over 2-TB in size, has a graphical user interface with network capability, and is backward and forward compatible. UEFI is expected to eventually replace BIOS.


11
10
9
8
7
6
5-0
Component
Address
Select
R/W
data
Data
R/W
RAM 1·1
RAM 1·2
RAM 1·3
RAM 1·4
RAM 2·1
RAM 2·2
RAM 2·3
RAM 2·4
3*8 decoder
0
1
2
3
4
5
6
7
ROM 1·1
ROM 1·2
ROM 2·1
ROM 2·2
1*2 decoder
0
1
Interface 1·1
Interface 1·2
Interface 1·3
Interface 1·4
Interface 2·1
Interface 2·2
Interface 2·3
Interface 2·4
Interface 3·1
Interface 3·2
Interface 3·3
Interface 3·4
Interface 4·1
Interface 4·2
Interface 4·3
Interface 4·4