A-Level Computer Science P1 Notes

First Edition

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CONTENT TABLE

Chapter 1:

Information representation

What is a Denary (Number system- Base 10)?

Is derived from a Latin word denarius which means tenfold, denary or decimal consist of numbers from 0 to 9

1. In Mathematics calculated by tens; based on ten; decimal
2. In Mathematics containing ten parts; tenfold

What is a Binary (Base 2)?

Binary a number system that has just two unique digits. For most purposes, we use the decimal number system, which has ten unique digits, 0 through 9. All other numbers are then formed by combining these ten digits.

Computers are based on the binary numbering system, which consists of just two unique numbers, 0 and 1. All operations that are possible in the decimal system (addition, subtraction, multiplication, division) are equally possible in the binary system.

Binary is comprises of 1 or 0

Bits and Bytes:

Bits: At the smallest scale in the computer, information is stored as bits and bytes.

- Bit, like an atom, the smallest unit of storage
- A bit stores just a 0 or 1
- Chip uses areas of electric charge as 0/1 states
- Hard drive uses spots North/South magnetism 0/1 states
- Group 8 bits turns into a byte

Bytes:

8	7	6	5	4	3	2	1
0	1	0	1	1	0	1	0

- One byte = grouping of 8 bits
- e.g. 0 1 0 1 1 0 1 0
- One byte can store one letter, e.g. 'A' or 'x'
- "Byte" - unit of information storage
- A document, an image, a movie ..how many bytes?
- Later we'll look at storage in: RAM, hard drives, flash drives
- All measured in bytes, despite being very different hardware

Kilobyte, KB,	about 1 thousand bytes/1024 bytes
Megabyte, MB,	about 1 million bytes/1024 Kilo bytes
Gigabyte, GB,	about 1 billion bytes/1024 Mega bytes
Terabyte, TB,	about 1 trillion bytes /1024 Giga bytes

Nibble :

In communications, a nibble is sometimes referred to as a "quadbit." or one of 16 possible four-bit combinations. A signal may be encoded in quadbits rather than one bit at a time.

4	3	2	1
1	0	1	0

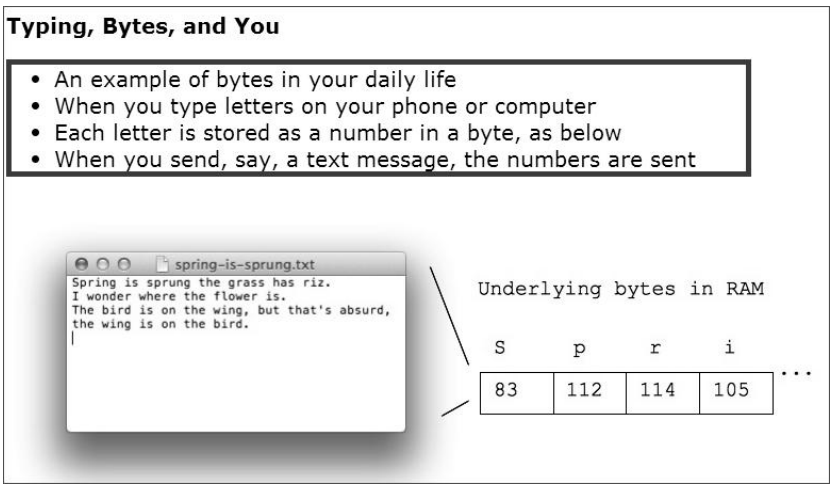
Bytes and Letters - **ASCII Code**

ASCII is an encoding representing each typed letter by number.Each number is stored in one byte of space in the computer (0..255)

- A is 65
- B is 66
- a is 96
- space is 32

As shown in ASCII Code List from 32 to 126 though original list contain 0 to 255 which mean 256 letter representation

32 space	65 A	97 a
33 !	66 B	98 b
34 "	67 C	99 c
35 #	68 D	100 d
36 $	69 E	101 e
37 %	70 F	102 f
38 &	71 G	103 g
39 '	72 H	104 h
40 (	73 I	105 i
41)	74 J	106 j
42 *	75 K	107 k
43 +	76 L	108 l
44 ,	77 M	109 m
45 -	78 N	110 n
46 .	79 O	111 o
47 /	80 P	112 p
48 0	81 Q	113 q
49 1	82 R	114 r
50 2	83 S	115 s
51 3	84 T	116 t
52 4	85 U	117 u
53 5	86 V	118 v
54 6	87 W	119 w
55 7	88 X	120 x
56 8	89 Y	121 y
57 9	90 Z	122 z
58 :	91 [	123 {
59 ;	92 \	124 |
60 <	93]	125 }
61 =	94 ^	126 ~
62 >	95 _	
63 ?	96 `	
64 @		



Conversion of Denary/Decimal to Binary

For Video Reference
Use Decimal to binary conversion.FLV

Consider the number 1110. The steps below show how to convert this number to binary using repeated division. The 'R' stands for the remainder of the division.

Step Involved	Process
First, we divide 11 by 2 to find the least significant digit (the rightmost digit). Since 1 is our remainder, the least significant digit in our answer is 1.	**11 / 2 = 5 R 1** Answer: ? ? ? 1
Next, we take the result of the previous division (5) and divide by 2 again. Since 5 divided by 2 leaves a remainder of 1, the next digit of our answer is 1.	**5 / 2 = 2 R 1** Answer: ? ? 1 1
Again we take the result of the previous division (2) and divide by 2. This time our division does not have a remainder, so we write a 0 as the next digit of our answer.	**2 / 2 = 1 R 0** Answer: ? 0 1 1
One more division by 2 gives us the most significant digit (the leftmost digit) of our answer. Since 2 will not divide 1, our result is 0 with a remainder of 1. We know we are done when we get 0 as the result of our division.	**1 / 2 = 0 R 1** Answer: 1 0 1 1