SOME CONTRIBUTION OF THE APN SYSTEM IN COMPUTER SCIENCE

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ABSTRACT

In this paper an attempt has been made it understand verity of different number system in clouding decimal, hexadecimal octal and binary. I find it a lot easier to understand this if I change the way I read these numbers in many head too.

For example far 10_8

I read "octal one-oh" or One-oh in base-eight

Each number system has a different base that is used to convert from a set of digits0 to a numeric value.

INTRODUCTION

When editing raw hex data, 010 Editor uses a variety of different number systems including decimal, hexadecimal, octal and binary. Each number systems has a different '*base*' that is used to convert from a set of digitals to a numeric value.

For example, the digits '246' can be converted to a number using base 10 by $2*10^2+4*10+6=246$.

In general, if the n digits of a number A are numbered where A_0 is the right-most digit. A_1 is the digit to the left and so on, then the value of a number of base *B* is calculated:

$A_{n-1}*B^{n-1}+A_{n-2}*B^{n-2}+.....+A_1*B+A_0$

The following is a list of the 4 number systems used:

Decimal

Numbers are represented as base 10. The digits may be any number from '0' to '9'. For example, In decimal $153=1*10^2+5*10^1+3$.

Base-10 Mathematically

We may have noticed a pattern by now. Let's look at what is going on mathematically, using 2347 as an example.

- *As we saw, there are 2 groups of a thousand. Not coincidentally, 1000=10*10*10 which can also be written as* 10^3.
- *There are 3 groups of a hundred. Again not coincidentally,100-10*10 or* 10^3
- *There are 4 groups of ten and* $10=10^1$

- *Finally, there are 7 groups of one and $1=10^0$. (That may seem strange, but any number to the power of 0 equal 1, by definition)*

This is essentially the definition of base-10.To get a value of a number in base-10, we simply follow that pattern. Here are a few more examples:

- $892=8*10^2+9*10^1+2*10^0$
- $1147=1*10^3+1*10^2+4*10^1+7*10^0$
- $53=5*10^1+3*10^0$

Admittedly, this all seems a little silly. We all know what value a base-10 number is because we always use base-10, and it comes naturally to us. As we'll see soon, though, if we understand the patterns in the background of base-10, we can understand other bases better.

Hexadecimal-

Number are represented as base 16. All the decimal digits are used, plus the letters 'A', 'B', 'C', 'D', 'E', and 'F' are used, to represent the number 10 through 15.
For example, in hexadecimal $3d7=3*16^2+13*16^1+7=983$. This system is commonly referred to as Hex.

Base-16 is also called hexadecimal. It's commonly used in computer programming, So it's very important to understand. Let's start with counting in hexadecimal to make sure we can apply what we've learned about other so far.

Since we are working with base-16, we have 16 digits So, we have 0, 1,2,3,4,5,6,7, 8, 9, and yikes! We've run of digits, but we still need six need six more. Perhaps we could use somethings like a circles 10?

The truth is, we could, but this would be a pain to type. Instead, we simply use letter of the alphabet, starting with A and continuing to F. Here's a table with all the digits of base-16:

Base 1&Digit	Value
0	0
1	1
2	2
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

Other than these extra digits, hexadecimal is just like any other base. For example, let's convert $3D_{16}$ to base-10. Following our previous rules, we have: $3D_{16}=3*16^0=48+13=61$, so $3D_{16}$ is equal to 61_{10}. Notice how we use D's value of 13 in our calculation.

We can convert from base-10 to base-16 similar to the way we did with base-8. Let's convert 696_{10} to base-16. First, we first the largest power of 16 that is less than $696_{10.}$ This is 16^2, or 296,Then:

1. $696/16^2=2$ remainder 184
2. $184/16^1=11$ remainder 8
3. $8/16^1=8$ remainder 0

We have to replace 11 with its digits representation B_2 and we get $2B8_{10}$.

Feel free to try some more conversions for practice. We can use the application below to check our answers:

<u>Octal</u>-

Numbers are represented as base 8. Only the digits '0' through '7' are used ('8' or '9' is not allowed). For example, the number $2740=2*8^3+7*8^2+4*8^1+0=1504$.

Base

On to base-8, also called octal. Base-8 means just what is ----------- like: the system is based on the number eight ------------

Remember how in base-10 we had ten digits? Now, in base-8, we are limited to only eight digits: 1, 2, 3,4,5,6 and 7. There's no such things as 8or 9.

We count the same way as we normally would, except with only eight digits. Instead of a lengthy explanation, simply try out the demo below by clicking "Count Up1" to see how counting in base-8 works.

We should notice a similar pattern to before: after we get to 7, we run out of different digits for any higher number. We need a way to represent eight of somethings. So we add another digit, change the 7 back to 0, and end up with 10. Our answer of 10 in base-8 now represents what we would normally things of as 8 in base-10.

Talking about numbers written in multiple based can be confusing. For example, as we have just seen, 10 in base-8 is not the same as 10 in base-10. So, from this point on.

I'll use a standard notation where a subscript denotes the base of numbers if needed. For example, our base-8 version of 10 now looks like $10_{g.}$

(***Editor's note: I find it a lot easier to understand this if I change the way I read these numbers in my head, too. For example, for $10_{g,}$ I read "octal one-oh" or "one-oh in base-eight", For 10_{10} I read "decimal one-oh" or "one-oh in base-ten",)*** Great, so we know 10_g represents eight items. (Always feel free to plug a number into the first tool for a visualization.) What's the next number after 77_g? If we said 100_g, ours are correct. We know from what we've learned so far that the first 7 in 77_g represents groups of 8, and the second 7 represents individual items. If we add these all up, we have 7*8+7*1=63. So we have a total of $63_{10.}$ So $77_8=63^{10}$.

Binary-

Number are represented as based 2. Only the digits '0' or '1' can be used. For example, the number

$10110=1*2^4+0*2^3+1*2^3+1*2^2+1*5^1+0=22$

-Unsigned vs signed binary integers

-Unsigned –positive integers only

-Base 2 notation:

-E.g.3710=1001012

-We normally deal in decimal =base 10

-3710=3*101+7*100

-40310=4*102+0*101+3*100

Unsigned Binary Integers

100101

32's 16's 8's 4's 2's 1's

Binary2 (Base-2)

On to the famous base-2, also called binary, While everyone knows binary is made up of 0s and 1s, it is important to understand that it is no different mathematically than any other base. There's an old joke that goes like this:

Can we figure out what it means?

Let's try a few conversions with base -2. First, we'll convert 101100_2 to base-10. We have: $101100=1*2^5+1*2^3+1*2^2=32+8+4=44_{10}$

Now let's convert 65 to binary. 2^6 is the highest power of 2 less than 65, so:

1. $65/2^6$ = 1 remainder 1
2. $1/2^5$ = 0 remainder 1
3. $1/2^4$ = 0 remainder 1
4. $1/2^3$ = 0 remainder 1
5. $1/2^2$ = 0 remainder 1
6. $1/2^1$ = 0 remainder 1
7. $1/2^0$ = 0 remainder 1

And thus we get our binary number, 100001.

Understanding binary is super important. I've included a table below to point out digits values.

Position	9	8	7	6	5	4	3	2	1	0
Power of Two value	2^9 512	2^8 256	2^7 128	2^5 64	2^5 32	2^4 16	2^3 8	2^2 4	2^1 2	2^0 1

For example, the value of 10001 is 17, which is the sum of the values of the two 1 digits (16+1). This is nothing different than we have done before, it's just presented in an easy to ready way.

TRICKS AND TIPS

Normally, when converting between two bases that aren't base-10, we would do something like this:

1. Convert number to base-10
2. Convert result to desired base

However, there's a trick that will let we convert between binary and hexadecimal quickly. First take any binary number and divide its digits into groups of four. So, say we have the number 10111012, Divided up we have 0101 1101. Notice how we can just add extra zeroes to the front of the first group to make even groups of 4. We now find the value for each groups as if it was its own separate number, which gives us 5 and 13. Finally, we simply use the corresponding hexadecimal digits to write out base-16 number, 5D16.

We can go the other direction also, by converting each hexadecimal digit into four binary digits. Try converting B716 to binary. We should get 101101112.

This trick similar trick for base-8, which is also a power of 2:

Steps	Example:
Start with a binary number	1101011100
Divide the binary number into groups of 3	001 101 011 100
Convert each binary group into an octal digit	1 5 3 4
Combine your digits to get the base 8 number	1534_8

Of course, we can reverse the process to go from base-8 to binary also.

CONCLUSION

Let’s go all the way back and revisit the color guessing game.

In Flash, colors are stored as a single number. When converted to hexadecimal, the first two digits represent the amount of red, the next two the amount of green and the final two the amount of blue. So, if our color is 17FF1816 we can easily tell that our red component is 1716 or 2310. Our green component is FF16, or 25510. Finally our blue component is 1816 or 2410. If we are given the base-10 version of our color, 157263210, we need to convert it to hexadecimal before we can tell anything about it.

Try the game again, and see how much better we can do!

We implement a new number system APN (Alpha Number System).

PROSPECTIVE AND PROGRESSIVE OF WORK

The APN System, that means Alpha Penta Number System (APN System). It is used in computer system to perform fast mathematical operation and that system is used as an intermediary system in computer such as representation of memory address or presentation of colors in graphical or console-based application that lookup the interface of application is more attractive.

APN System use penta base; that means base of the number system is 32 (2^5). Identify symbol of APN series is prefix a (Alpha).

Ex:- $(aA2CMJ)_{32}$

HYPOTHESIS

This system used in 32 distinct symbolic representation which is started from natural number 0 to 9; such as represent 0,1,2,3,4,5,6,7,8,9 and 22 alphabetic symbols started from A to V such A ->10, B->11, C->12, D->13, E->14, F->15, G->16, H->17, I->18, J->19, K->20, L->21, M->22, N->23, O->24, P->25, Q->26, R->27, S->28, T->29, U->30, V->31.

GAP IN WORK

Limitation of the APN system is started from lower APN zero (i.e.0) to upper APN value 31 in incremental natural (incremented by 1).

Ex:- $\alpha(2\ C\ J)_{32}$

$A(2\ C\ J)_{32}$ The weight of the

2 1 0

$=2\times32^2+12\ 32^2+19\times32$

$=2\times0124+12\times32+19\times1$

$=2024+384+19$

$=2451$

PLANE FOR WORK

- Hardware Specification
- PIV, Core,Dual,13,15 and 17 Processor
- 2 GB RAM
- Monitor LED/LCD/CRT
- Hard disk 40/80/500GB
- CD/DVD/Other Device
- Keyboard/Mouse

2	**2451**	**1**	**5-BIT** **00010** **2** **01100** **C** **10011** **J**
2	**1225**	**1**	
2	**612**	**0**	
2	**306**	**0**	
2	**153**	**1**	
2	**76**	**0**	
2	**38**	**0**	
2	**19**	**1**	
2	**9**	**1**	
2	**4**	**0**	
2	**2**	**0**	
	1		

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