Introduction to Computers

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OF CANADA

BINARY?

- Yes / No, Ones / Zeros
- It is the principles of computer science
- Only 2 possibilities

- Combination of binary will represent

TEXT GAME IMAGE   MUSIC VIDEO PROGRAM

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NUMBERS

- Dividend ÷ Divisor = Quotient   Remainder
    154   ÷   4   =   38   R → 2

Place the value table
    154 = (1x100) + (5x10) + (4x1)

REAL NUMBERS

- Dividend ÷ Divisor = Quotient

     0.154   ÷   4   =   0.0385

Place the value table

    0.154 = (1x0.1) + (5x0.01) + (4x0.001)

Successive Powers

- Infinite series of 10

$1\quad +\ 10\quad +\ 100\ +\ 1{,}000\ +\ 10{,}000 + \ldots$

$10^0 +\ 10^1\ +\ 10^2\ +\ \ 10^3\quad +\ 10^4\qquad +\ \ldots$

Infinite series of 2

$1\quad +\ 2\ +\ 4\ +\ 8\quad +\ 16 + \ldots$

$2^0\ +\ 2^1\ +\ 2^2\ +\ 2^3\ +\ 2^4\ +\ \ldots$

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CONVERTING BINARY TO DECIMAL

- Binary Number : 10101

Binary number	1	0	1	0	1
Successive powers of 2	2^4	2^3	2^2	2^1	2^0
calculation	1 x 16	0 x 8	1 x 4	0 x 2	1 x 1
decimal	16	0	4	0	1

10101 = 16 + 0 + 4 + 0 + 1

10101 = 21

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CONVERTING DECIMAL TO BINARY

- Decimal Number : 51

2	51	remainder -> 1
2	25	remainder -> 1
2	12	remainder -> 0
2	6	remainder -> 0
2	3	remainder -> 1
2	1	remainder -> 1

110011

Basic calculation

- $2^8 = 256$

- $2^{16} = 65,536$

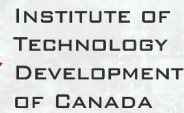- $2^{32} = 4,294,967,296$ (4 billion)

- $2^{64} = 18$ quintillion

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ASCII – 1960s

UTF – 8

- Backwards compatible with ASCII

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EXERCISE BINARY TO DECIMAL

- 01001000 ?
- 01000101 ?
- 01001100 ?
- 01001100 ?
- 01001111 ?

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Thank You!