

Unit 3

by Chandra Kant

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Unit 3 Discussion Board

Chandra Kant

CE242-1802B

CTU

Discussion Board: Computer programing and ¹Data Representation

- Discuss the difference in machine code, assembly code, and high-level languages.

Computers are both complex and simple machines that aid in day-day operations of virtually every aspect in every field. Simple in that they are user friendly and a little training gets one going, and a bit complex in the way they execute functions. While they allow people to perform

whatever tasks they may be having, they do so by representing the data in basically two sets; 0 and 1 and that is where coding, representation and language come in.

Machine codes are a set of instructions written in a machine language that can be executed directly by the Central Processing Unit where each instruction is assigned or otherwise carries a specific task such as jump, a load and an arithmetic logic unit. They are the lowest level of structure visible and detectable by a programmer. In their executions, they use microcodes in a much more complex way transforming the instructions into sequence of micro-ops. While machine codes are executed and so understood by the CPU, assembly codes are plain text representations that are somehow readable by the user with a direct link to the 1:1 analog instructions which are not understood by the CPU (Csfieldguide.org.nz, 2018). Assembly codes are usually converted into the machine by the use of compilers. High level languages on the hand ² is a programming language such as C, FORTRAN or PASCAL that enables a programmer to write programs that are less or more contingent on any specific type of computers. While assembly languages are low level and so closer to machines, high level ² languages are considered high as they are closer to humans and further from machines.

- ¹ • Discuss how data is represented across decimal, binary, and hexadecimal and how a computer would convert the various representation types.

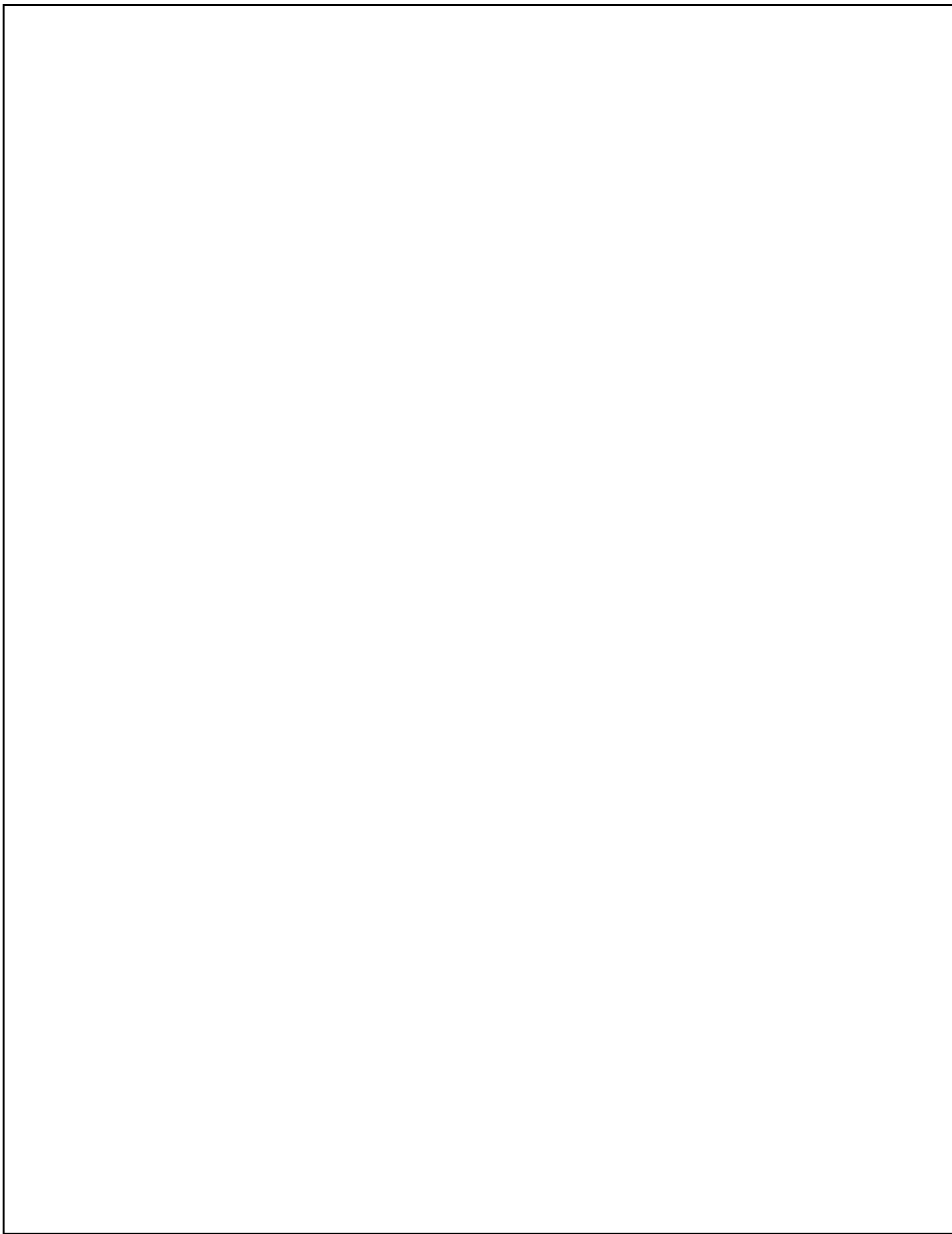
The decimal system, which is the number 10 is the best counting sequence that humans use and in the same way, the computer does too. Data represented by the numbers from 0 to 9 is counted with the values being placed on the right most number with sequence and procedure getting to the next left which is usually ten times higher than its immediate left. Though this principle may sound obvious and straight, understanding with respect to data representation is key. A number

like \$125 means 5 represents \$5, while 2 and 5 represent \$20 and \$ 100 respectively (Homepage.cs.uri.edu, 2018). Binary is a mathematical system of numbering that computers use which is equivalent to the decimal counting of between 0 and 9 but in this case it only uses two states; 0 and 1. Computers express data in these two states, akin to an ON and OFF switch system to represent data by use of what is called bits. Bits are either 0 or 1 but the program is such that the bits are grouped into eight chunks called bytes. Basing on this byte representation, the basic binary of 01000011 represents 67 which depending on the type of data represent different meaning. That is from adding 1 in the ones, 1 in the twos as well as 1 in the 64's place ($1+2+64$). Binary numbers are stored electronically, but having large numbers to write down is too involving and complex. And that is where hexadecimal system sets in. Copying a 16 bit digit of 0101001110010001 is easier by breaking them into four digits, 0101 0011 1001 0001, then writing the total which is 5391. A 1 digit number 1011 1000 1110 0001 for example would be broken down as follows. By using letters A-F, the system writes it as B8E1. The letter B would represent 1011 which is decimal 11 as E would represent 1110 which is decimal 14. the 16 base digit is now the hexadecimal (Homepage.cs.uri.edu, 2018).

References

Csfieldguide.org.nz. (2018). *Data Representation - Computer Science Field Guide*

Homepage.cs.uri.edu. (2018). *Data In The Computer*.



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