Unit 1 Data Structure Translations

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Conversion methods are extremely important to understand, as an IT professional. They can give a better understanding of computer hardware and how that might relate to user interactivity. At the same time, it can help developers have a more holistic approach to understanding hardware restrictions—especially as it relates to storage solutions. These storage solutions might be limited to the space on an SSD, or the speed at which a hard drive might write. In these situations, developers might use a different variation of recording data to accommodate such restrictions. Because of this using alternative methods from the decimal system that we are used to might prove handy.

One such conversion method would be that from decimal to binary. This particular conversion is extremely important in the computer science environment, as binary is the standard way for digital system to record data, and store memory (Beach, 2016). Is binary is stored in ones and zeros respectively developers may not have much use for that information as it relates to human readable decimal numbers. Because of this, a conversion is necessary. This conversion can help translate data into something a developer or user can read. This conversion can be done relatively simply. One would take each value from right to left, and increase the order of magnitude by the power of 2. Then, a simple mathematical calculation can be done on each digit to be added together and form the final result (Jones, n.d.). Using this theory, the binary number 1111 may be translated to 15.

Another important conversion method would be decimal to hexadecimal. Hexadecimal has stood the test of time by being a widely-used part of the computing world. It has gained favour among developers for the efficiency compared to that of decimal or binary. Conversion in this method can be done by taking a decimal number, and continually dividing it by 16. The quotient and remainders must be noted for each division. Outputs above 9 will be represented by letters to make up for the remaining digits (The University of Washington, n.d.). This base 16 is therefore orders more efficient than base 2 or 10 as it takes fewer digits to express higher numbers.

A third crucial conversion would be that of binary to hexadecimal. Although strictly speaking neither the input nor output is classified as human-readable, understanding this conversion and how it works is crucial in the digital age. For this conversion, one must follow the steps to convert a given binary input into the base 10 decimal system as detailed above. Then they may simply follow the steps to convert that decimal number into hexadecimal as detailed above (The University of Washington, n.d.). This can be essential for optimizing the binary output of a CPU to store more efficiently in a compressed storage solution.

Understanding these conversions may go a long way to helping a developer obtain a more holistic approach to software design. In many circumstances, certain restrictions are imposed on a give development team. Real world examples of these restrictions may take the form of technical specifications to a certain computer type that the producer or stakeholders may be targeting for their intended audience. This computer may lack cutting-edge hardware such as a spacious solid state drive, or may lack such a high-speed drive all together. In these circumstances, it is imperative to understand numerical translations. These translations will allow a developer to work around those limitations and provide an output that may better suit the given use-case. Computers that lack storage capacities may be better suited for outputs stored in hexadecimal formatting. Computers that do not have the capabilities for such intensive translation algorithms may do best working with data structures strictly in binary in order to alleviate the CPU’s burden while processing this data. Furthermore, even if the machines a developer is working with do support the latest hardware, micro-optimizations play a vital role in maintaining functional business strategies, and may go on to safe valuable resources and expenditures needed while reducing the overhead on such applications. For instance, despite having immensely powerful technology at their disposal, Netflix may need to incorporate every bit of optimizations to streaming data in order to ensure the lowest bandwidth needed to reach the maximum number of potential clients.

# **References**

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