

DNA PLA: A Nano-Biotechnological Programmable Device

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Abstract : Computing in biomolecular programming performs through the different types of reactions. Proteins and nucleic acids are used to store the information generated by biomolecular programming. DNA (Deoxyribose Nucleic Acid) can be used to build a molecular computing system and operating system for its predictable molecular behavior property. The DNA device has clear advantages over conventional devices when applied to problems that can be divided into separate, non-sequential tasks. The reason is that DNA strands can hold so much data in memory and conduct multiple operations at once, thus solving decomposable problems much faster. Programmable Logic Array, abbreviated as PLA is a programmable device having programmable AND operations and OR operations. In this paper, a DNA PLA is designed by different molecular operations using DNA molecules with the proposed algorithms. The molecular PLA could take advantage of DNA's physical properties to store information and perform calculations. These include extremely dense information storage, enormous parallelism, and extraordinary energy efficiency.

Keywords : biological systems, DNA computing, parallel computing, programmable logic array, PLA, DNA

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