

# Toward a Framework for Design Exploration of Low-Cost Parallel Microfluidics Circuits and Algorithms for DNA-based Data Storage Architectures

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With the rapid increase of generated data, and the associated challenges to store and access this data [1], the interest in Deoxyribonucleic acid (DNA)-based data storage has increased significantly. DNA-based data storage solutions promise to revolutionize data storage due to the exceptionally high data densities and durability of DNA, and the capacity to retain random data access semantics. This would be advantageous over conventional long-term data archival solutions, which are currently dominated by magnetic tape which imposes inherently sequential limitations at the storage media level [2]. In this talk we will give an overview of how DNA-based storage may be integrated in the broader data center storage landscape and how possible pathways to parallel DNA-based data storage systems may be explored.

A key constraint of DNA-based storage is, for example, the high latency associated with the bio-chemical protocols that have to be performed to synthesize, store, and retrieve data encoded in DNA. By exploiting parallelism on various levels, a DNA-based system could outperform many conventional storage systems, but today the required equipment to do so at meaningful scales would be extremely expensive. In the second part of this talk we will focus on possible opportunities to study and optimize microfluidic circuits and algorithms for DNA-based data storage architectures by developing a co-design framework for simulation and rapid-prototyping of DNA storage architectures leveraging Electrowetting-on-Dielectric (EWOD) [3] on printed-circuit boards (PCBs) [4,5] as illustrated in Figure 1.

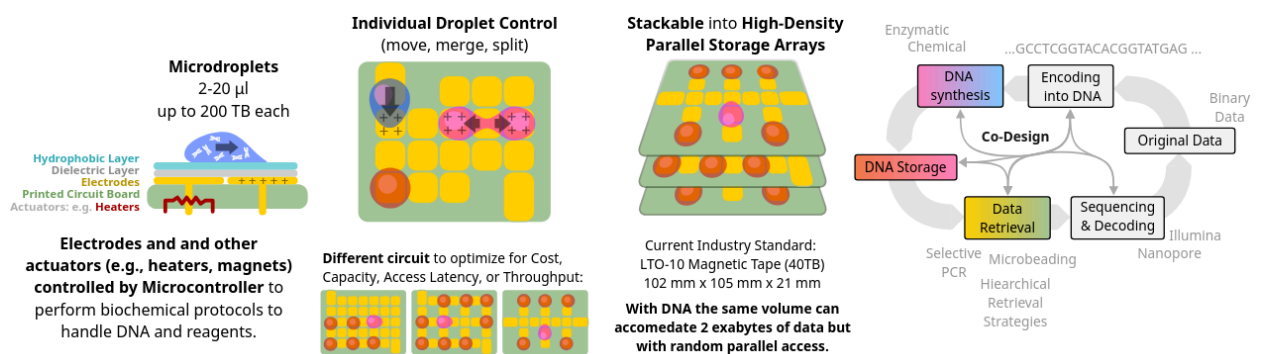


Figure 1 - Electrowetting-on-Dielectric (EWOD) for DNA-base data storage presents a co-design challenge but can help automate various steps in the end-to-end data life-cycle from digital binary data to data encoded and stored in DNA-based substrate.

## References

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