1171-94-107 Francisco Maturana and Rashmi Vinayak* (rvinayak@cs.cmu.edu). Convertible Codes: Efficient Conversion of Coded Data for Large-scale Storage Systems.

In large-scale data storage systems, erasure codes are employed to store data in a redundant fashion to protect against data loss. In this setting, a set of k data blocks to be stored is encoded using an [n, k] code to generate n blocks that are then stored on distinct storage devices. In our recent work, we showed that the failure rate of storage devices varies significantly over time, and that dynamically tuning the parameters n and k of the code provides significant reduction in storage cost. However, traditional codes suffer from prohibitively high resource overheads in changing the code parameters on already encoded data. In this talk, we will (1) present a new theoretical framework to formalize the notion of "code conversion"—the process of converting data encoded using an [n, k] code into data encoded using a code with different parameters [n', k'], while maintaining desired decodability properties, (2) introduce "convertible codes", a new class of codes that enable resource-efficient conversion, (3) present tight bounds on resource requirements of convertible codes and present optimal explicit constructions. (Received August 09, 2021)