Cheap and Large CAMs for High Performance Data-Intensive Networked Systems

NOTE: Your slides/presentation need to cover the assigned sections and questions in a clear and well-organized manner. You are allowed to borrow contents from other resources, such as online slides, as long as you acknowledge them. For a slide that covers a given question, please print the question on the slide where it is covered. However, you don’t have to answer the question using a long paragraph of text on the slide. Instead, use bullet points, graph, animation, or oral explanation to answer the question. In your Q&A report, use text to more thoroughly answer the questions.

Only need to cover sections before Section 5.1.3 and skip Section 2 “Related Work”.

1. “A key idea behind BufferHash is that instead of performing individual random insertions directly on flash, DRAM can be used to buffer multiple insertions and writes to flash can happen in a batch.” Very briefly explain the difference between the ways of FAWN and BufferHash in which they locate a KV pair written on the flash?

2. “BufferHash consists of multiple super tables. Each super table has three main components: a buffer, an incarnation table, and a set of Bloom filters.” Use Figure 1 to describe BufferHash’s data structure.

3. “This is an in-flash table that contains old and flushed incarnations of the in-memory buffer.” Please explain the relationship between the buffer and the incarnation.

4. “Since the incarnation table contains a sequence of incarnations, the value for a given hash key may reside in any of the incarnations depending on its insertion time.” Please explain why Bloom filters are needed.

5. “A super table supports all standard hash table operations” Describe the steps involved in insert, lookup, update/delete operations.

6. “If the Bloom filter matches, the incarnation is read from flash, and checked if it really contains the key. Note that since each incarnation is in fact a hash table, ....”. Could you describe the structure of the hash table? Could we hold all incarnations’ hash tables in the memory? Why?