Dynamic Coding for Improved performance of Memories

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July 21, 2014

1 Performance and Complexity Estimates

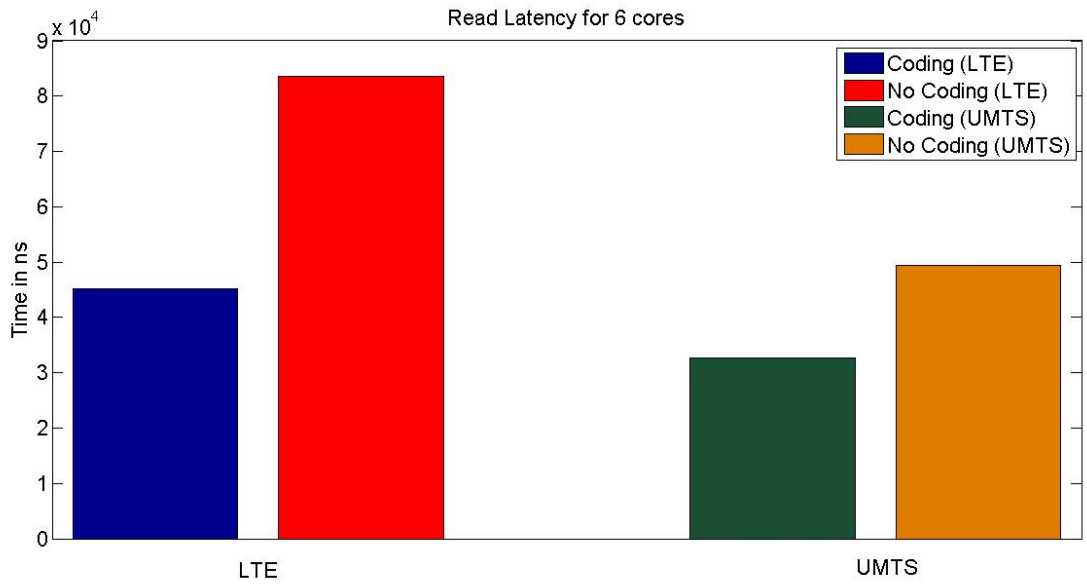

Figure 1: Comparison of Coding vs No-Coding for UMTS and LTE

- Figure 1 shows an improvement of over 15% on both LTE and UMTS traces. As can be infered from the figure, the use of memory coding allows us to reduce the read latency by atleast **15**%.
- The overhead of coding is divided in to memory overhead and control logic overhead.
- The memory overhead is dependent on the α fraction of memory which is coded using the dynamic coding scheme.

- For the given traces, α is approximately equal to **6**% of the overall memory.
- The logical overhead is due to the scheduling of accesses for the use of coding banks at the memory controller. This may vary according to the specific implementation of the scheduling algorithm.

Table 1 presents the benefits and cost of each of the sub-scheme. It essentially presents the summary of the analysis done in the previous sections where we introduced each of these schemes. The condensed tabular format can be used to compare the cost and benefits of each of the sub-schemes.

Sub Scheme	Benefits (Per Region)	Costs
Memory Coding	• 10 reads Best case • 7 reads worst-worst case • 2 writes per bank so 8 writes per region. Both for best case and worst case.	• 1.5α times more memory. • control logic overhead for doing parallel reads and writes. • Overhead of re-coding after a write. Each write needs a 3 reads and 4 writes.
Dynamic Coding	• Reduces the memory overhead to 5% in case of LTE. • Makes α to be 6% for UMTS.	• Control logic for doing dynamic allocation. • Overhead of recoding during change of coded region.
Prefetching the codes	Benefits more efficient reads	Control logic for looking ahead in memory queue to prefetch the codes.

Table 1: Cost and Benefit of Coding scheme