Despite multi-core revolution, high single thread performance is still an important processor goal. Modern program do not lack parallelism (ILP). Microarchitecture: Similar to next generation MIPS Warrior core from Imagination Technologies.

Real challenge: Exploit parallelism w/o undue costs. Fortunately, look-ahead lends itself to various optimizations due to constraints in the look-ahead of the look-ahead.

Look-ahead thread runs on a separate core and maintains its data in local L1, no writeback to L2. Sends execution based branch hints through BOQ and also helps prefetching in the shared L2 cache. Look-ahead thread can uncover significant implicit parallelism with moderate hardware support. However, look-ahead thread becomes a new bottleneck.

Skeleton Payload Tuning
• Skeleton payload: Cache prefetch, Branch prediction
• Tune skeleton payload based on the code phases

Despite significant performance advantage, slower look-ahead thread often becomes the new bottleneck. A compelling technique for turbo boosting at lower cost.