

# CPU Core IPC Enhancements

- Advanced branch prediction
  - 32B instruction fetch
  - **Sideband Stack Optimizer**
  - Out-of-order load execution
  - TLB Optimizations
  - Data-dependent divide latency
  - More Fastpath instructions
    - CALL and RET-Imm instructions
    - Data movement between FP & INT
  - Bit Manipulation extensions
    - LZCNT/POPCNT
  - SSE extensions
    - EXTRQ/INSERTQ,
    - MOVNTSD/MOVNTSS
- ▶ **Perform stack adjustments for PUSH/POP operations “on the side”**
  - ▶ **Stack adjustments don’t occupy functional unit bandwidth**
  - ▶ **Breaks serial dependence chains for consecutive PUSH/POPs**