Lecture 10 ()

In India we have a standard: we spend a lot of money and it gets wasted. We don't keep it simple.

1 ReOrder Buffer (ROB)

1. It is basically a queue
2. Once it becomes oldest, it is guaranteed to be on the correct path
3. Stores execute when they are the oldest in ROB

1.1 Implementation

1. Contains entry for each instruction that has been fetched
2. Pipeline stalls if table is full
3. Instructions are entered in program order
4. When instruction finishes, its entry is marked ready
5. When it becomes the oldest, it is committed/retired
6. ∃ width which defines the number of instructions to commit per cycle

2 Branch Miss Prediction

1. Instructions newer than the branch instruction are on wrong branch
2. No memory has been modified - stores are not executed yet
3. We wait for this instruction to become the oldest
4. Once it becomes oldest, we flush the ROB and restart

3 Restoring physical registers

1. We decide when to update the free list
2. On decoding of a branch instruction, we take a snapshot of RAT
3. Free list is updated when next allocation of the register becomes oldest
   - if prediction had been unsuccessful, then we restore the mapping (when prediction became the oldest)

4   Retirement Register File/Retirement RAT

Mapping of registers when flushing

we studied in online, but exam khud se dena abhi seekhoge

5   Load/Store Instruction

1. Executed only when they are being committed
2. This ensures that they are on right path and there are no interrupts before this

6   Alternatives to RRF and RRAT

1. Take a snapshot
2. SRAM or CAM based
3. Read on your own