Exceptions with Speculative Instructions

Techniques to avoid exception handling on wrong-path instructions

- ignore until instruction is no longer speculative
- handle resumable exceptions & return undefined value for terminating exceptions
  - if wrong path, value ignored
  - if right path, program is incorrect & will generate incorrect results
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Techniques to avoid exception handling on wrong-path instructions

- handle a terminating exception only if the result is about to be used by nonspeculative instruction
  - poison bit on each register; speculative bit in each instruction
  - poison bit of result register set if speculative instruction results in terminating exception
  - a use of a poisoned result by a speculative instruction sets the poison bit for its result
  - a use by nonspeculative instruction triggers exception handling
  - buffer results of speculative instructions until commit
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Techniques to avoid exception handling on wrong-path instructions

• “check load address” instruction
  • located where load used to be
  • hardware tracks if store to this address
  • if yes, reload
  • might have to reexecute dependent instructions