Hardware Support for Compiler Speculation

Hardware support for preserving exception behavior

• ignore exception 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
Hardware Support for Compiler Speculation

Hardware support for preserving exception behavior

- 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
Hardware Support for Compiler Speculation

Hardware support for memory reference speculation

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