

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