IOPMP Task Group Meeting

February 29, 2024

Video link

Meeting Notes

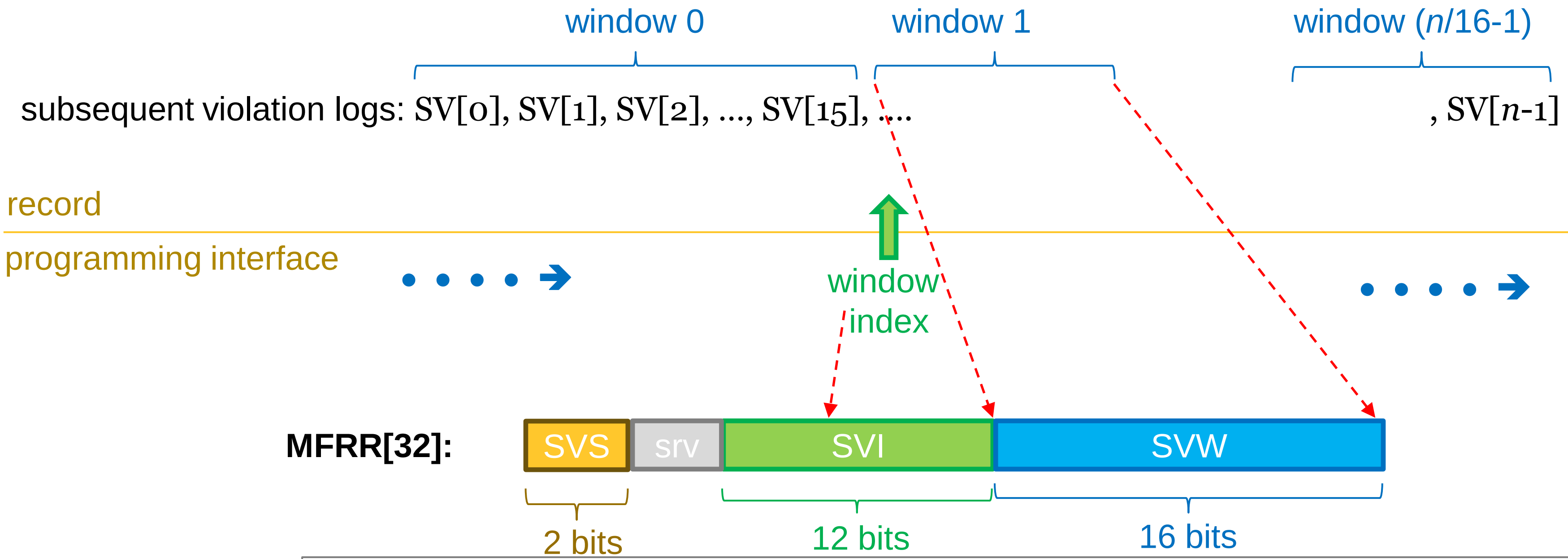
- The RERI-compliance error report:
  - An IOPMP violation is NOT a RAS event, and
  - The SW handling the RAS is NOT the same SW handling the IOPMP violation.
  - If there is no strong requirement, we won't comply with RERI in version 1.0.0. Defer to a future version if needed.
- Since Sifive's members are absent, the WG-related topics are postponed:
  - For a violation, should selecting a bus error response be controlled by
    - per-entry or per-RRID?
  - Resolve the overlap of the World Guard checker and IOPMP:
    - The programming model of the association between RRIDs and entries:
      - Sifive's reference flow was presented, but in what case/scenario?
    - An entry is locked by an individual bit or by an incremental counter?
- Multi-fault record:
  - Andes' proposal

Multi-fault record of Andes' proposal

- Definition:
  - First violation: a violation which is caught and recorded in the error report.
  - Subsequent violation: a violation which is caught but NOT recorded in the error report since the first violation occupies the error report.
- Problem:
  - Subsequent violation(s) are totally invisible. We at least need to know which RRID triggers the violation when the error report is occupied.
- Proposed mechanism:
  - A per-RRID bit, SV[*rrid*], indicates if one or multiple subsequent violations from the RRID.
- Programming Interface: one register, **MFRR**, **M**ulti-**F**ault **R**ecord **R**egister:
  - A 12-bit field, SVI, is an index of the current window.
  - A 2-bit field, SVS, a state
  - A RO 16-bit field, SVW, is a window of 16 continuous SV's, that is
    - SVW[15:0]=SV[{SVI, 4'b1111}: {SVI, 4'b0000}];

Multi-fault record (cont.)

n: # of RRID, up to 64K



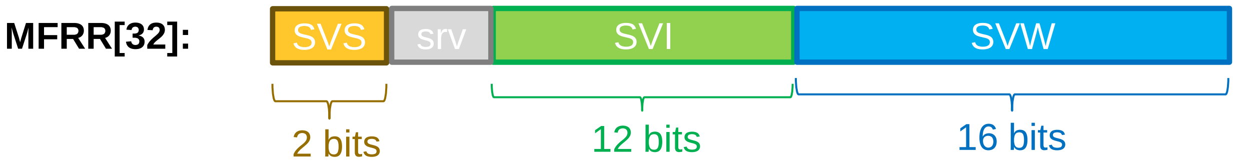
On read MFRR, SVI moves forward (and round) until finding a window with any SV[i]=1.

If found, the state (SVS) will be 2'b01 and SVW shows SVs in the window indexed by SVI.

If not found, SVS=2'b00.

On write, the only SVI is WARL.

Multi-fault Record Register, MFRR



- On read MFRR: SVI moves forward/round to find a window with any SV[i]=1
  - If found:
    - the state (SVS) will be 2’b01 and then clear SVs in the window
    - SVI is the index of the current windows
    - SVW contains the SV’s in the current window
    - The above SV’s will be clean after read
  - If not found: SVS=2’b00. SVW is all 0.
- On write, the only SVI is WARL. The rest fields are read-only.
- A **else-bit** (in ERR_REQINFO): indicates if any subsequent violation in log

Remarks

- Provide an interface the log of multiple violations
- Programming interface: a single 32-bit register is needed
- Single transaction can retrieve the next violation:
  - HW (always get the next) scan instead of SW (scan and test)
  - Auto clear
  - Better scalability and efficiency for a large number of RRIDs.