Using TSX For NVM Consistency

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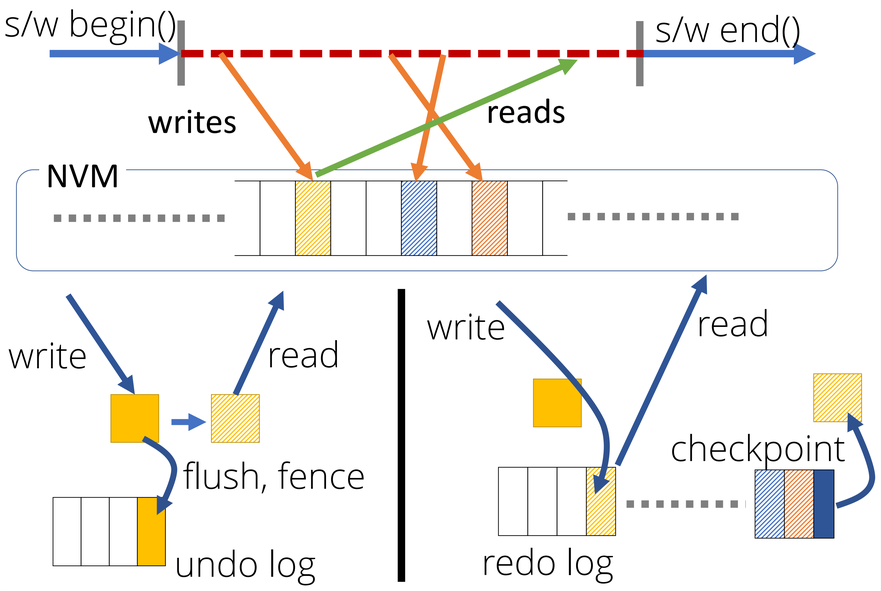
vmware RESEARCH

1

- Non-volatile memory (NVM) provides persistent load/stores at memory speeds
- Crash-consistent/ atomic NVM updates still need software transactions



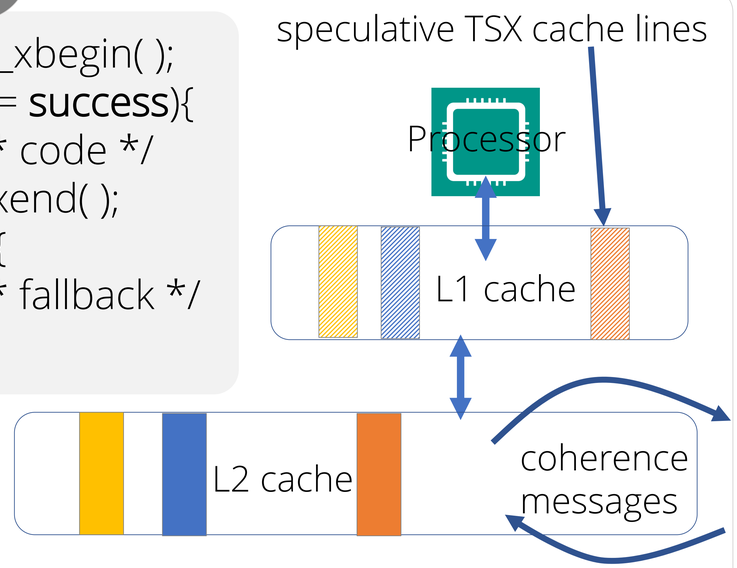
2

- Undo-logging needs frequent cache flushes and memory fences
- Redo-logging needs read re-direction
- **Software transactions have high overheads!**

- Intel TSX supports **atomic** and **isolated execution** of code blocks
- TSX does not guarantee durability nor crash-consistency

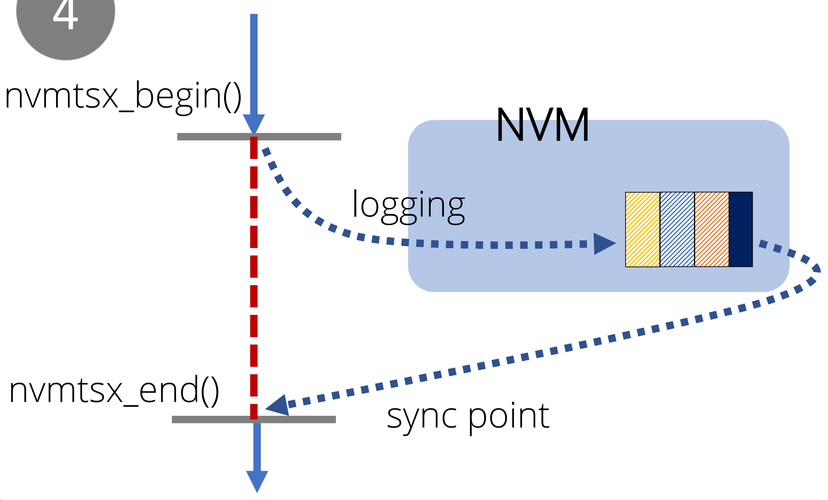
3

```
st = _xbegin( );
if(st = success){
    /* code */
    _xend( );
else{
    /* fallback */
}
```



- Keep speculative cache lines in L1
- Use cache coherence protocol to detect conflicting updates
- Optimistic concurrency semantic

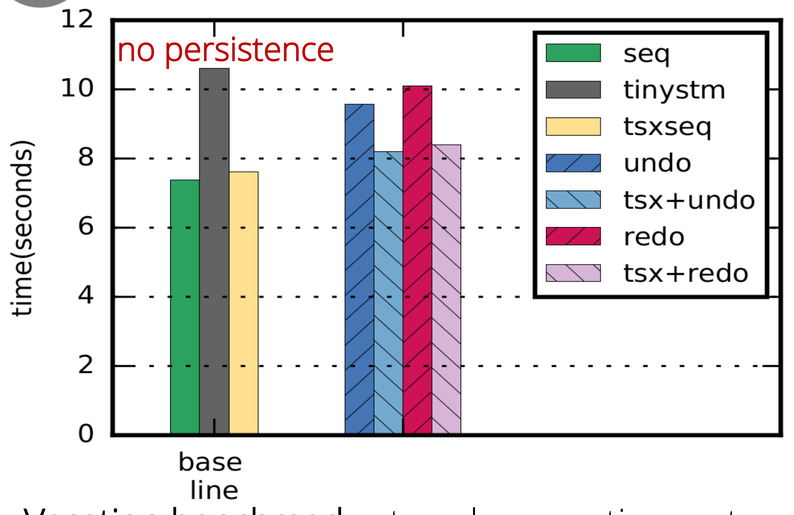
4



5

- No memory fencing and cache flushing after every write
- No read re-direction
- Logging is overlapped with transactional execution of the code
- Optimistic concurrency enabled durable transactions

6



- **Vacation benchmark** – travel reservation system
- Application runs with single thread, on real hardware.