Open vSwitch

Scaling the OVN Control Plane in OVS 2.6.0

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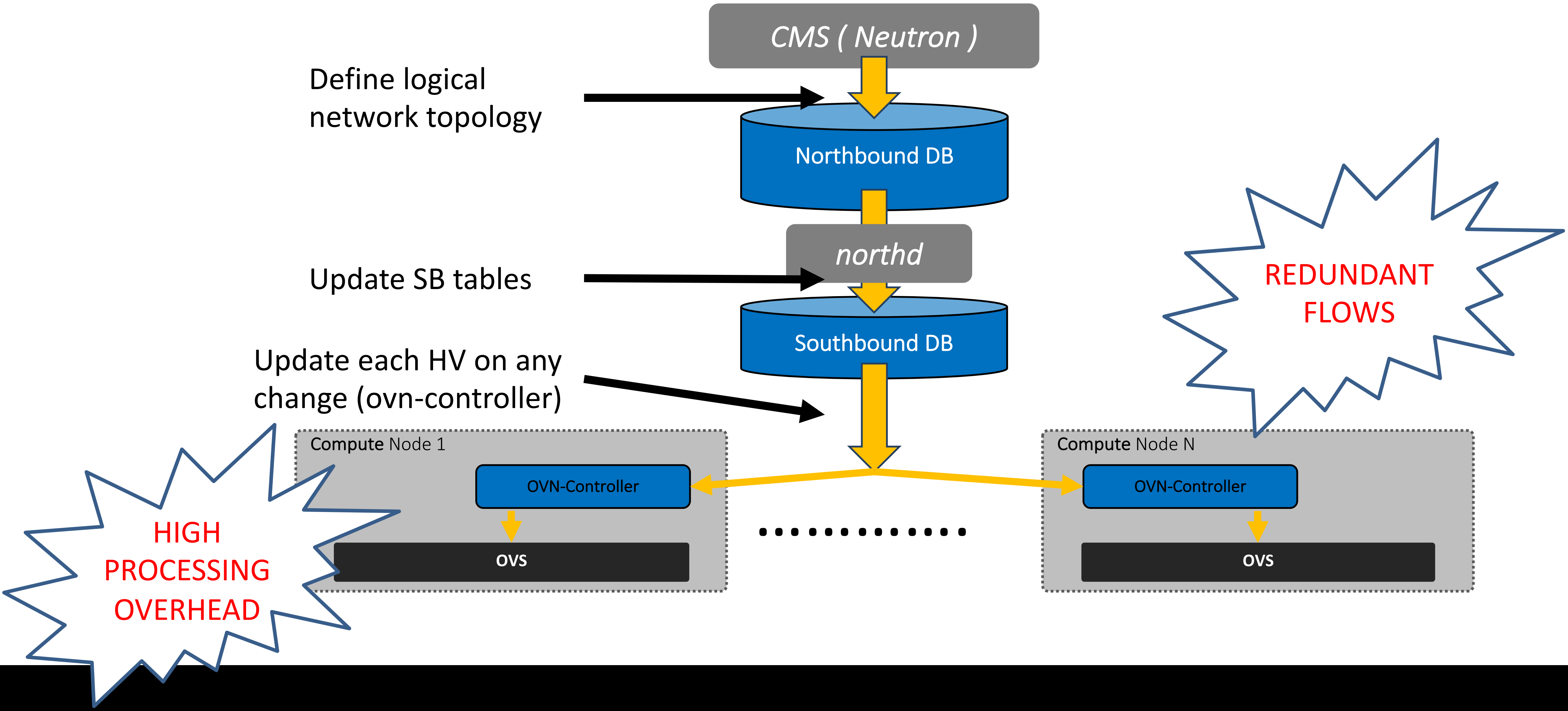
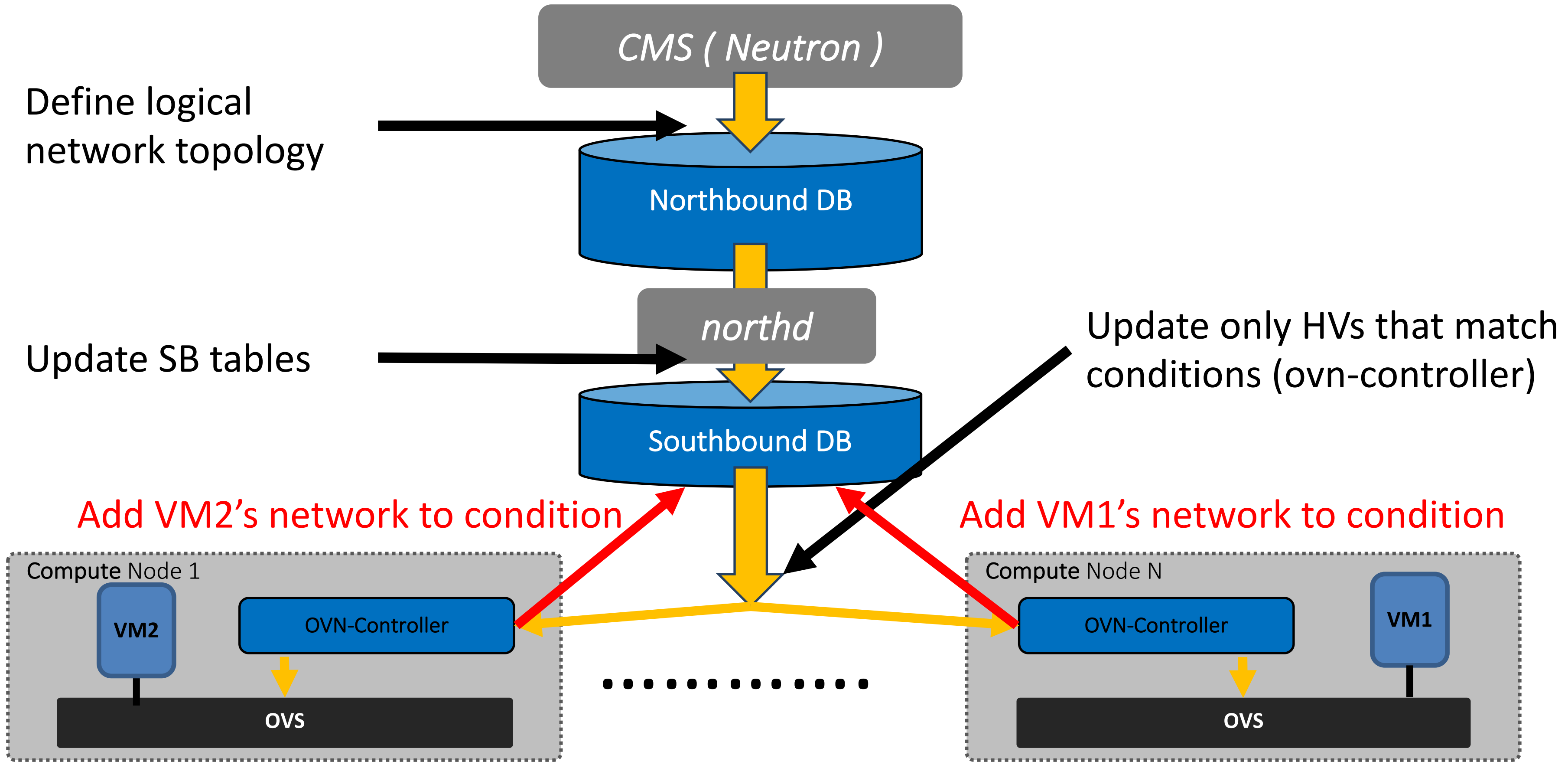
Topics

- Conditional Monitoring
- Wire Protocol Optimization
- Incremental Processing
- Open Need

OVN architecture



Conditional monitoring


CMS (Neutron)
Define logical network topology
Northbound DB
northd
Update SB tables
Update only HVs that match conditions (ovn-controller)
Southbound DB
Add VM2's network to condition
Add VM1's network to condition
Compute Node 1
VM2
OVN-Controller
OVS
Compute Node N
OVN-Controller
VM1
OVS

OVSDB protocol extension

Add to the OVSDB protocol the following requests:

- monitor_cond:
  Allows clients to start a conditional monitor session
- monitor_cond_change:
  Allows clients to iteratively change the conditions of the monitor session

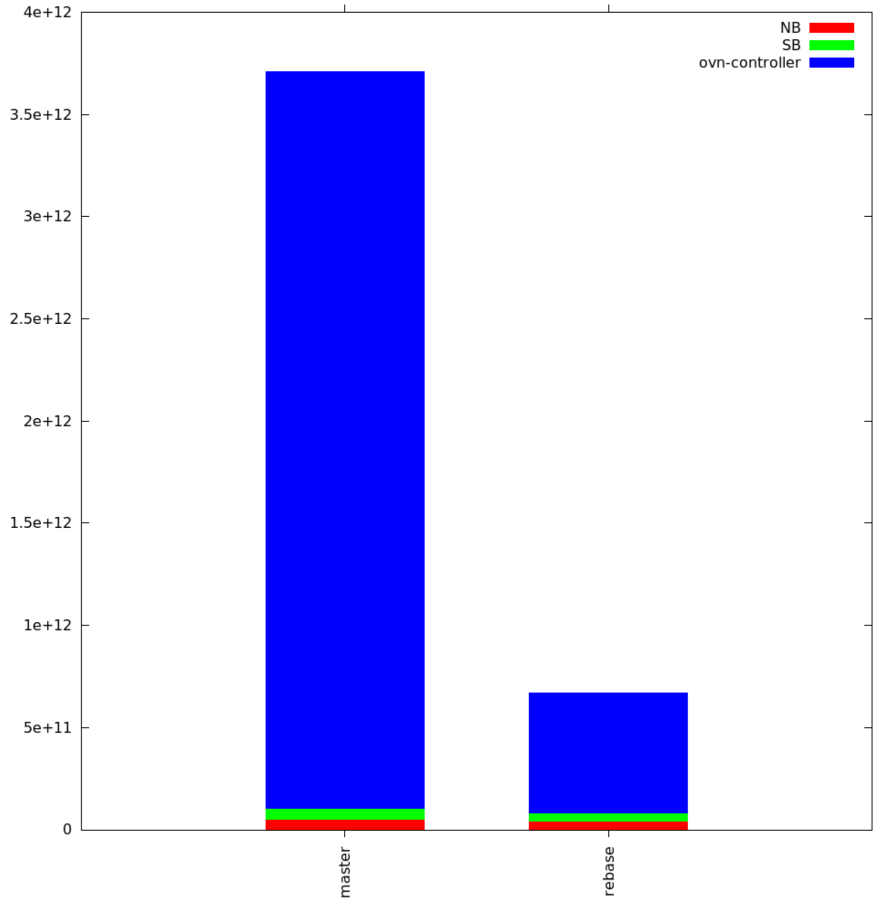
API usage

```
ovsdb_idl_add_clause_false(idl, tableA); // Start with empty table

while (1) {
      ovsdb_idl_loop_run(idl);
      ...
      ovsdb_idl_add_clause(idl, tableA, clause1);
      ...
      ovsdb_idl_loop_commit_and_wait(idl);
}
```

OVN patch – 250~
lines of code

Total CPU Cycles Count



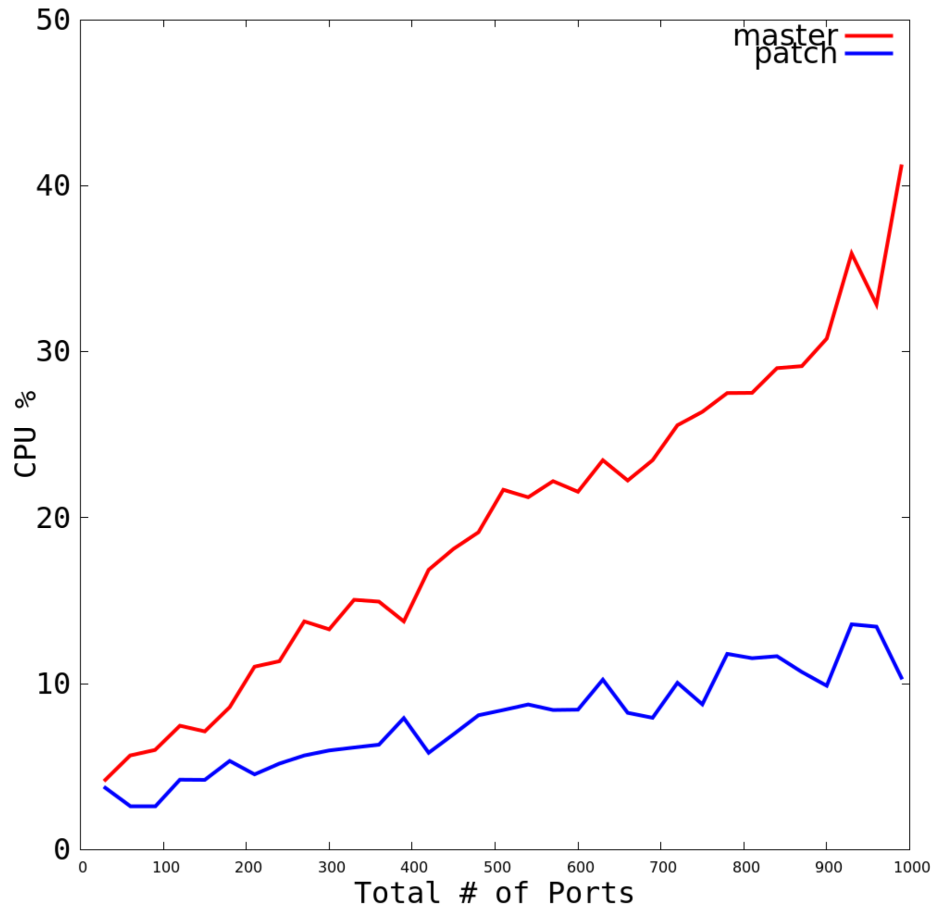
- # of Flows:
  - Patch
    - Logical flows = 5010
      - Host 1 # flows 835
      - Host 2 # flows 927

        …
      - Host 50 # flows 1111
  - Master
    - Logical flows = 5010
      - Host 1 # flows 5793
      - Host 2 # flows 5819

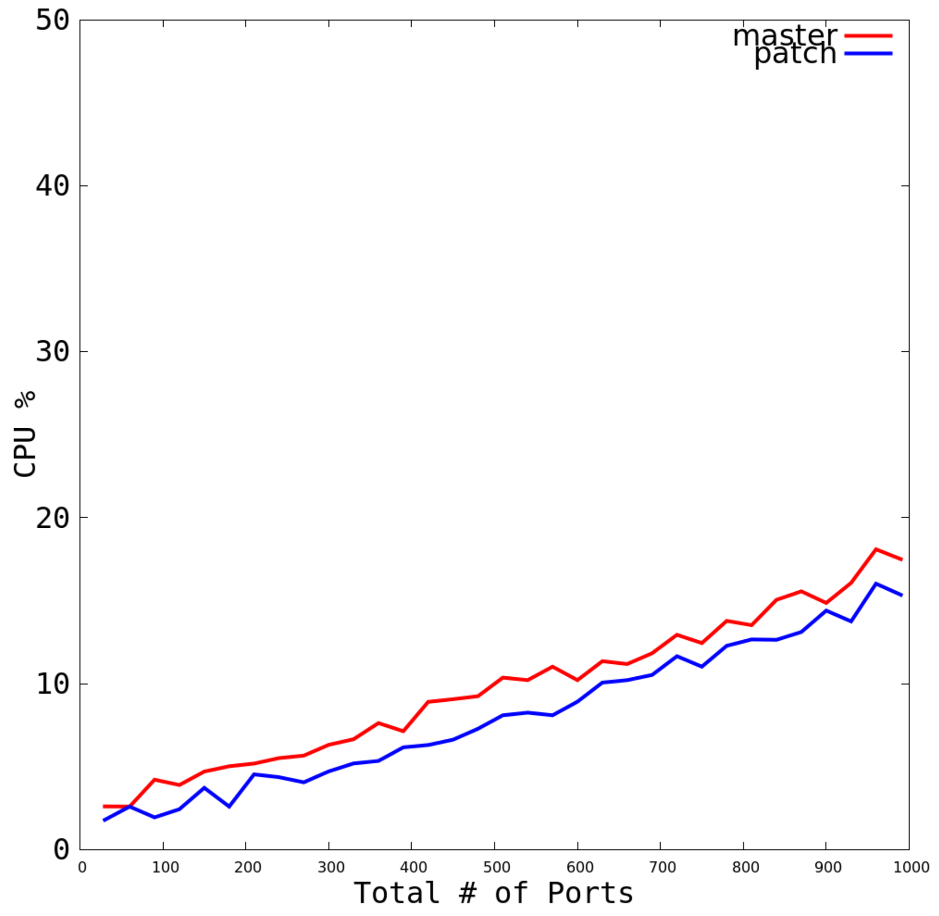
        …
      - Host 50 # flows 5871

CPU Usage Comparison

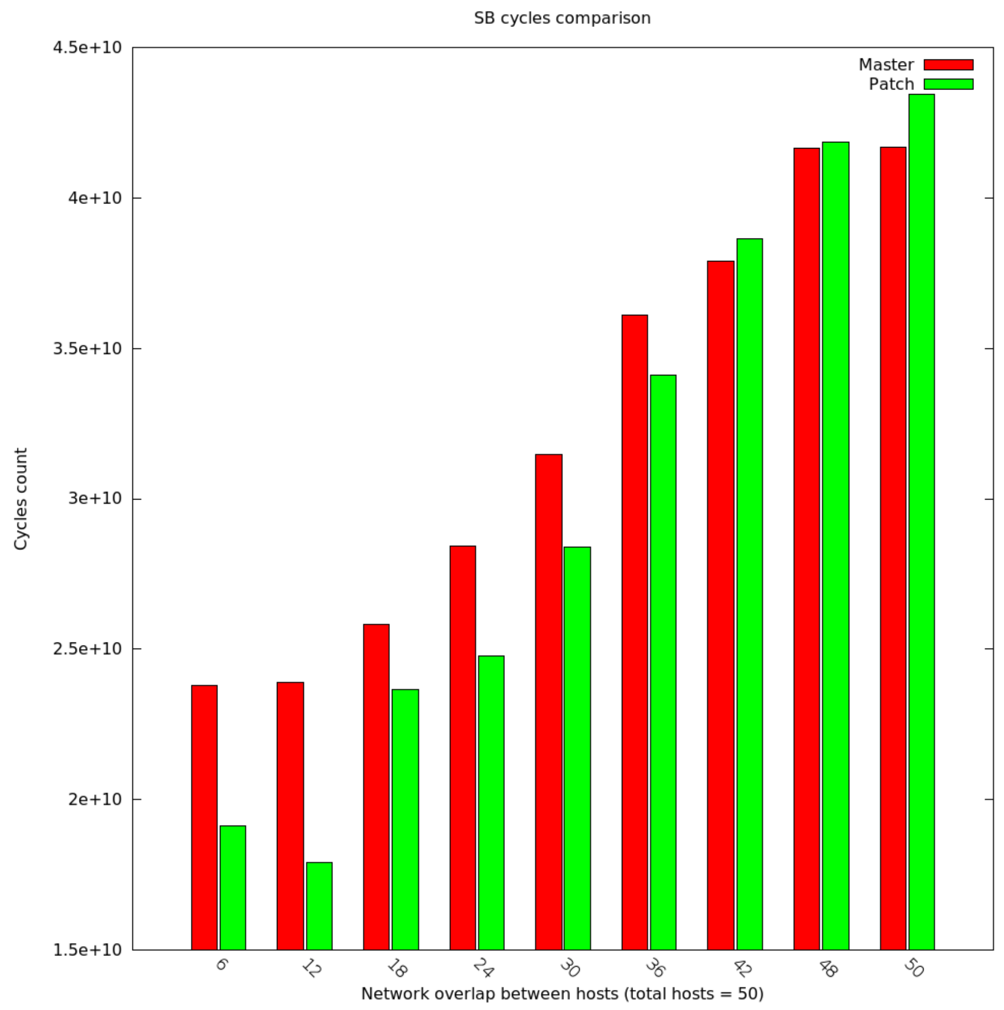
Host CPU utilization



SB-server CPU utilization



Influence of network spread over DC on SB



Wire protocol optimization

- OVSDB protocol options for changing data
  - Read-modify-write
    - Transmits entire row state from client to server for verification to avoid dirty reads
  - Mutate
    - Only transmits row deltas

How to get there

OVS

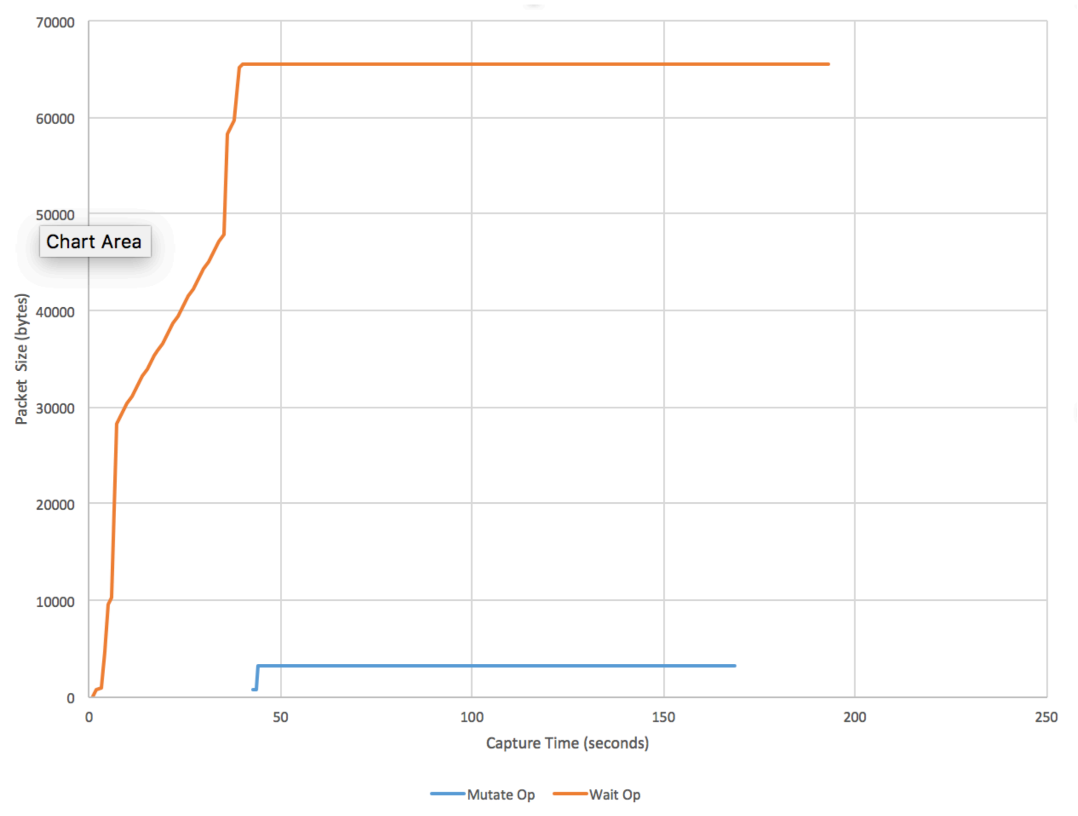
- Extend HPE's partial map update contribution to cover partial sets
- Expose partial set update capability in Python IDL

CMS

- Call new partial set update capability

What does it buy us?

- Rally test adding ports to a local switch and ACL entries
- Sniff protocol stream from CMS to OVN NB DB



Another data point

- CMS: OpenStack Neutron+networking-ovn (Newton)
- Test: Time taken to launch 10 instances from Horizon

- Using read-modify-write: 60 seconds
- Using partial set updates: 37 seconds

- ~40% improvement

Incremental Processing

- OVN controller process performs a full recalculation of all OVS flows each pass.
- At scale:
  - Pegs a CPU
  - Controller loop time exceeds 1 second, leading to lag in picking up new changes from Southbound Database
- Goal: only recalculate changes

But…

- Attempt didn’t quite work
  - Persisting state is hard
  - Too many “back doors” to full recalculation

- Result:
  - Didn’t provide a gain during scale up/scale down
  - Quiesces OVN controller doing idle time (but there are simpler ways to get there)

Open Need

- NB and SB DBs
  - Today, one ovsdb-server process for each
    - Defeats increasing concurrency via horizontal scaling
  - Clustering for both NB and SB
    - Avoid SPOFs
    - Horizontally scale NB
    - “Shard” chassis among SB

Questions?

- Thanks for listening!