Optimization of Lustre* performance using a mix of fabric cards

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Agenda

• High variety of RDMA solutions

• Network optimization

• LND tunables and new ko2iblnd.conf

• Co-existence of different cards

• Conclusion
High variety of RDMA solutions

- Infiniband
- Omni-Path
- RoCE
- iWARP
Typical Configuration

- Infiniband
- Omni-path
- Other fabric

New version
Network optimization

Intel® True Scale Infiniband:
• With default LNET configuration the performance is much worse than with LNET tuned

Intel® Omni-Path:
• Maximum performance can be obtained with LNET tuning

Mellanox* Infiniband:
• Don't need to tune LNET for old cards but for new it can be tuned

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LND tunables

• ko2iblnd.ko has 24 tunable parameters

• Parameters are read only once during the loading module into the kernel
  • at boot or when Lustre is first mounted

• All sets of parameters in single ko2iblnd.conf
Example of /etc/modprobe.d/lustre.conf

```bash
options lnet networks="o2ib0(ib0)"
options ko2iblnd peer_credits=128 peer_credits_hiw=64 ...
```
New /etc/modprobe.d/ko2iblnd.conf

alias ko2iblnd-**opa** ko2iblnd

options ko2iblnd-**opa** map_on_demand=32 ...

alias ko2iblnd-**mlx** ko2iblnd

options ko2iblnd-**mlx** map_on_demand=0 ...

alias ko2iblnd-**xxx** ...

options ko2iblnd-**xxx** ...

Profile name
Card detection and tunables selection

- Handled via `/usr/sbin/ko2iblnd-probe` script at runtime

- Any user-space tools can be used for card detection
  - for example: “lspci -v | grep Mellanox”

- Tunables can be selected individually for each
  - type of card
  - version of card
  - specific user defined feature
INFINIBAND="/sys/class/infiniband"

PROFILE=""

if [-d $INFINIBAND]; then
    for dev in `ls -d $INFINIBAND/* | sed -e "s#^$INFINIBAND/###" -e 's#_[0-9]*$##'`; do
        case $dev in [...]
        esac
    done

    # Set profile name according priority
    if [ ... ]; then
        PROFILE="-xxx"
        fi
    fi

    exec /sbin/modprobe --ignore-install ko2iblnd$PROFILE $CMDLINE_OPTS
Mixed Configuration

Omni-Path Switch

InfiniBand Switch

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Co-existence of different cards

• Single OFED distribution should support all cards

• OFED API hides the details about cards

• LND tunables are common for all network interfaces now
  • The fixes are coming (LU-6850, LU-3322 and LU-7101)

• The performance of routers depend on the slowest card
Currently it isn't possible to auto-tune LND optimally inside the kernel since the OFED API hides the details.

Unfortunately, there isn't a single set of parameters that provide optimal performance for different cards.

Card detection and tunable selection is handled via 
/usr/sbin/ko2iblnd-probe at runtime when the ko2iblnd module is loaded, either at boot or when Lustre is first mounted.
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