Virtio & networking

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status and challenges
RX

virtio-net

Guest

RX queue

KVM

Vhost-net

tap
Performance

- Line rate under many workloads
- But not always
- Progress

# Perf top

```
copy_user_generic_string     25%
```
Data copy

- Guest
- Vhost
- tap
- bridge
- NIC
- copy
Zero copy

- Guest
- Vhost
- NIC
- tap
- bridge
Guest -> External

CPU utilization

Zero copy

Data copy

04/14/13
multiqueue

Guest

TX
RX
TX
RX

TX
RX
NIC
TX
RX

04/14/13
virtio

- OASIS standardization
- New virtio devices
- Remoteproc-virtio firmware
## Vhost/virtio storage

<table>
<thead>
<tr>
<th>Host</th>
<th>Guest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tcm-vhost (vhost-scsi)</td>
<td>virtio-scsi</td>
</tr>
<tr>
<td>Vhost-blk</td>
<td>virtio-blk</td>
</tr>
</tbody>
</table>
Zcopy RX

Guest

KVM Vhost tap bridge tap Vhost KVM

Guest B

NIC

?
NUMA

VM

VCPU
Vhost

Host

CPU
CPU
CPU
CPU
Overcommit scalability

2N threads

Host

CPU

CPU

CPU

CPU
Overcommit scalability

N+m < 2N
Efficiency, $m = 8$ cores

Shirley Ma IBM
Idle host scalability
External -> Guest

Efficiency, m = 8 cores

Shirley Ma IBM
Status

- Virtio specification +
- Vhost interfaces +
- Zero copy TX +
- Multiqueue V
TODO

- Guest2guest Zero copy
- Zero copy RX
- scalabilty
- NUMA
Thank you

● Any questions?