

# JackRabbit for on-demand Media Service

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# About JackRabbit

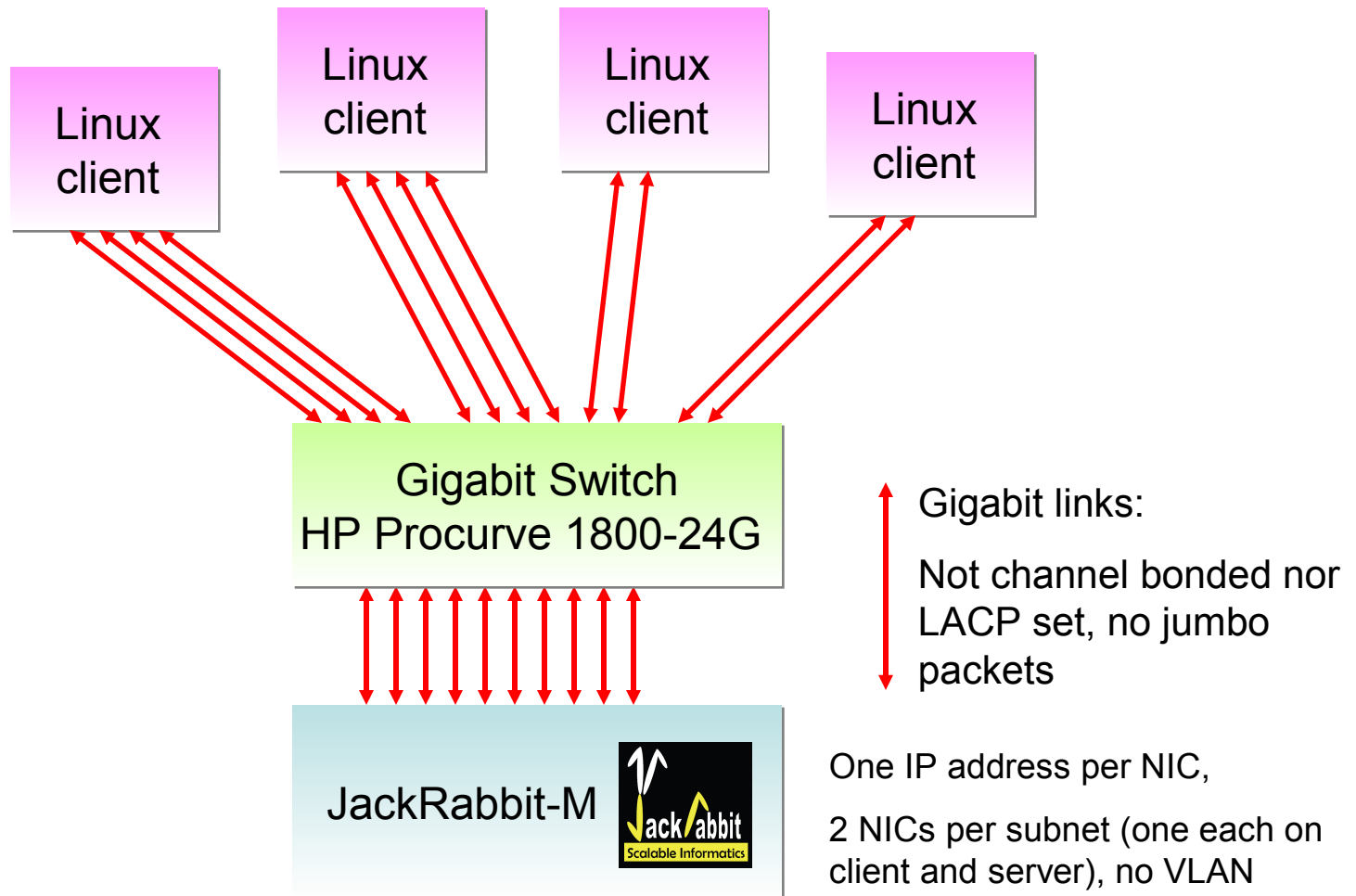


- High performance
  - Storage
  - Processing
  - Networking
- Low cost
  - Base configurations start significantly less than \$1/GB
- Highly reliable/flexible
  - Hardware accelerated RAID
  - Multiple OS support: Linux, Windows, Solaris
  - Appliance OSes: OpenFiler, Nexentastor, others.
- Variety of form factors
  - Deskside
  - 3-5U rack mount
  - Fully populated racks
- High capacity
  - 1.6-9.6 TB per U
  - 14.4 TB per U coming soon
- High Bandwidth
  - Multiple Gb/10Gb network options per unit
  - 0.2 – 2.7 GB/s per U

# Several tests to measure performance

- **Video download**
  - Assuming web server
  - Assets in a directory
- **Video streaming**
  - Assuming web server
  - Assets in a directory
- **No “standard” tests in market**
  - We created our own, with data, and methodology
- **Testing concept**
  - Use real media for streaming
  - Use media-like files for downloading (random data to defeat compression)

# Test architecture



# Video download tests

- 10x 2.5 GB “media” files
  - Random content to defeat compression
- JackRabbit M
  - 24x 500 GB SATA II disks
  - 10x Gigabit Ethernet ports
- Server OS: tested with
  - Windows 2003 server 32 bit
- Clients:
  - Linux machines over GbE using “ab” from apache-tools, with concurrency from 2 to 16 clients per GbE

- Results: using 6 GbE NICs
  - Windows 2003: **549 MB/s**
- Results: using 8 GbE NICs
  - Windows 2003: **774 MB/s**

NICs were not channel bonded

# Video download tests

- 100x 100 MB “media” files
  - Random content to defeat compression
- JackRabbit M
  - 24x 500 GB SATA II disks
  - 10x Gigabit Ethernet ports
- Server OS: tested with
  - Windows 2003 server 32 bit
  - Windows 2008 server 32 bit
  - Linux 64 bit
- Clients:
  - Linux machines over GbE using “ab” from apache-tools, with concurrency from 2 to 16 clients per GbE
- Results: using all 10 NICs
  - Windows 2003: **703 MB/s**
  - Windows 2008: **952 MB/s**
  - Linux 64 bit: **1029 MB/s**

NICs were not channel bonded

# Video streaming tests

- Using 0.7-3.5 GB videos
  - From Internet Archive
- Videos were
  - Mpeg2
  - 720x480 @ 30 FPS, 3500.0 kbps (437.5 kbyte/s)
  - Audio channels: 2x 48 kHz,
- Clients: mplayer with null display/audio driver
  - mplayer -vo null -ao null [http://192.168.8.240/Attack\\_From\\_Space.mpeg](http://192.168.8.240/Attack_From_Space.mpeg)
  - Streams and decodes video/audio, but does not display
  - Useful for testing
- A code to run multiple of these mplayer sessions simultaneously

# Video streaming results

- Running 450 clients across 4 machines
  - 2 NICs on JackRabbit-M were saturated
  - 8 NICs still available
  - CPU usage under 10% during test

# Notes

- These are **not cached** results:
  - Multiple different videos were streamed
  - Aggregate size was larger than RAM
  - Much larger than 32 bit maximum memory
- Ran out of client streaming capacity

# Conclusions

- **JackRabbit-M**
  - Handles large asset download loads at near maximum theoretical bandwidth
    - 10x 1Gb/s ~ 1200 MB/s, **observed 1029 MB/s (86% efficiency)**
  - Handles large numbers of on-demand streaming clients for real videos
    - Significant headroom, was unable to approach limits in our testing
    - **450 clients saturating only 2 NICs**
    - Projecting system as tested capable of
      - **2200 clients** with 10x 1GbE NICs
      - **2800 clients** with 10GbE NICs
      - Large JackRabbit capable of 2x the disk and network bandwidth (assuming similar size video and frame rates to what we tested)

# For more information



<http://jackrabbit.scalableinformatics.com>