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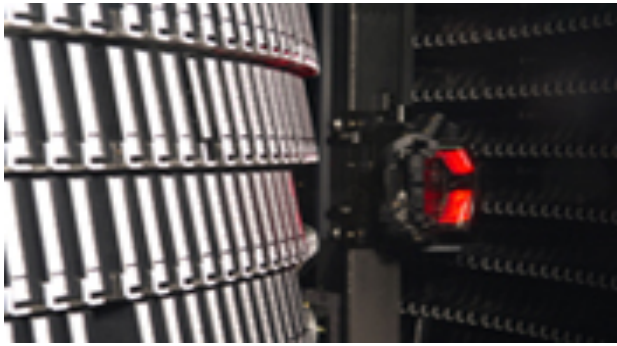

Data Transfer Tools - Exascale Performance Requirements

Susie McRee (Project Lead), Bill Collins (Production Lead)

Joint Facilities User Forum on Data-Intensive Computing

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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Agenda

- Introduction
- Current
  - Technology
  - Tools
  - Performance
- Towards Exascale
  - Requirements
  - Futures
  - Approach

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- High Performance Storage System collaboration
  - Executive/Technical member
  - Transfer tool development
    - Parallel FTP – HPSS, intra-host (PFTP server)
    - Transfer Agent (TA) – SNL & GEL (Gleicher Enterprises Ltd.)
    - HSI/HTAR – development, support
- Tri-Lab (SNL, LLNL, LANL)
  - Tool installation, configuring, tuning
  - WAN (DisCom)
- Advanced Computing at Extreme Scale(ACES)
  - Cielo

Current, Tri-lab Technologies

- Network Technology
  - 10Gb LAN, near future 40Gb (?)
  - InfiniBand
  - 10Gb Tri-Lab WAN, Future 100Gb (SNL, LANL)
- File system
  - Lustre
  - Panasas
  - Traditional
    - Network File System (NFS), Extended File system (EXT), etc.

Tri-Lab tools

- Parallel File Transport (PFTP)
  - Primary HPSS development, SNL
  - HPSS, client, (host) server
  - Multi-path, Multi-network
- Transfer Agent (TA)
  - Developed by SNL, GEL
  - Multi-host – large file performance
- HSI/HTAR
  - Multi-thread, concurrent transfers
  - HSI, Integrated TA – contracted, GEL
  - Host server (aka non-HPSS HSI gateway) – contracted, GEL

Tri-lab performance

- "Large" file transfers
  - 2 X 2TB, LANL (FTA) to SNL (HPSS) - 630MB/s
    - HSI, two simultaneous transfers
    - Pdata protocol (request/send)
    - 2.6ms RTT
  - 2 X 2TB LLNL (HPSS) to LANL (FTA) – 195MB/s
    - 40.1ms RTT
- Many/small file transfers
  - 4 X HTAR each 135K files, 4.5TB
  - LANL (FTA) to SNL HPSS, aggregate 534MB/s
- Largest SNL HPSS file, 20TB
  - Who's got the 50TB?

Exascale demands

- Projected data demands
  - 2-6PB, 10's to a few 100's million files
  - 10 -> 100Gb/s WANS
  - Same processing/storage use cases(?)
- Broad requirements
  - Discussions with LLNL, LANL, ORNL, NERSC
  - Still gathering requirements – wpcolli@sandia.gov, srmcree@sandia.gov

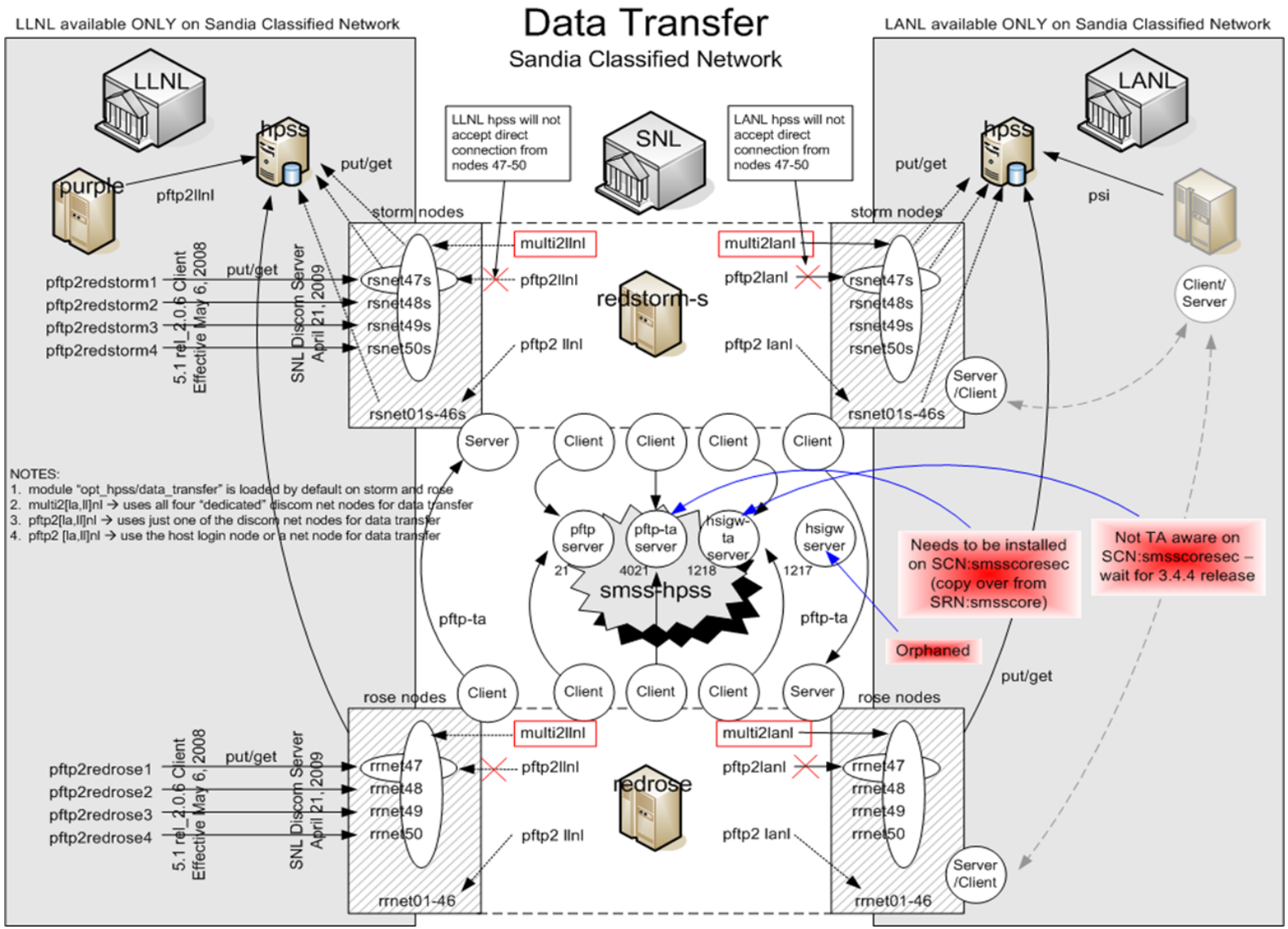
Exascale desirables

- User
  - Initiate transfers
  - Monitor transfers
- Presentation
  - GUI – ease of use
  - Web based
  - Cell phone app (?)

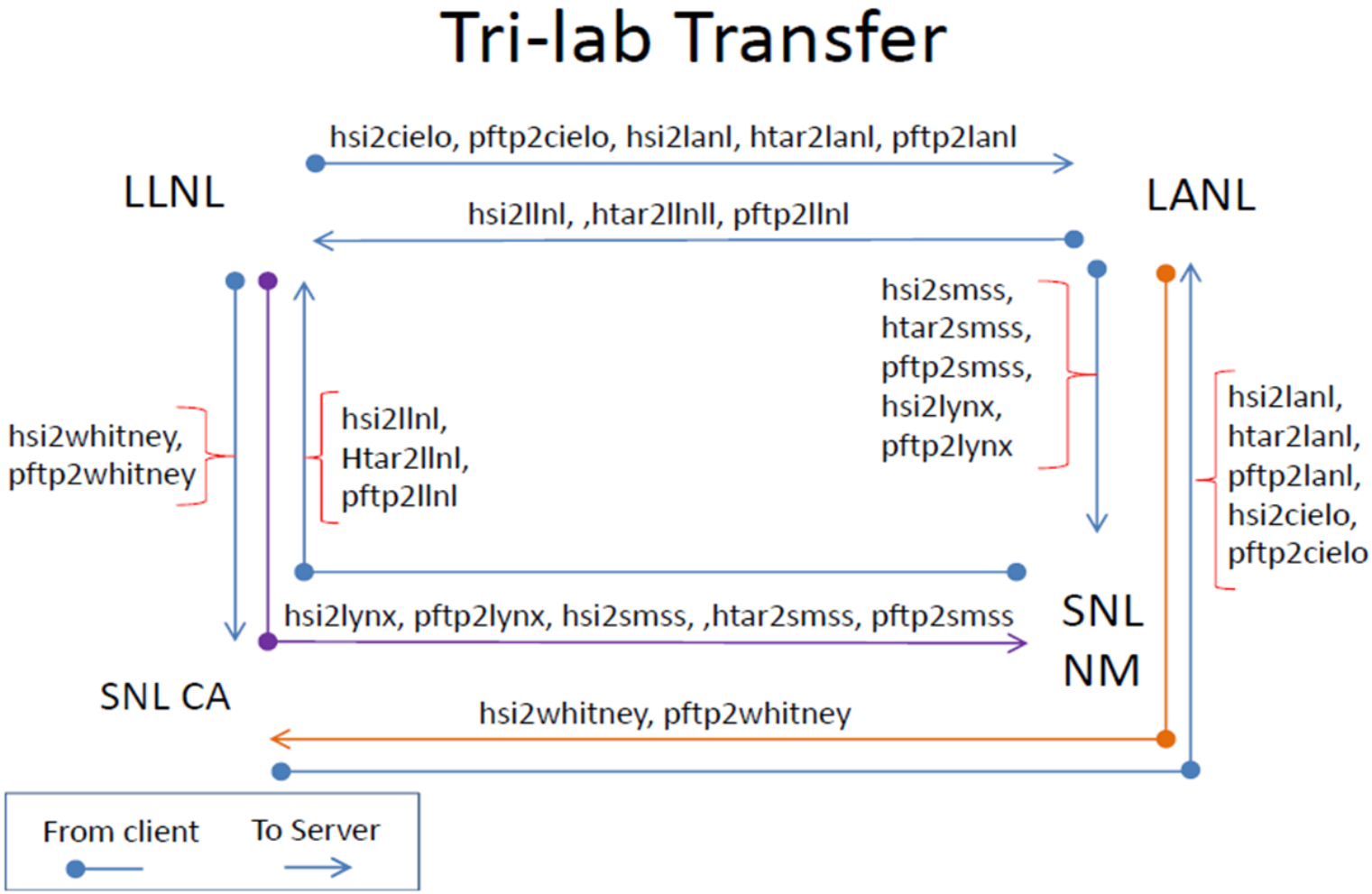
Customer view

- Primary importance
  - Easy of use – first blush
  - Utility – second…
  - Performance
- Not just a list of features
  - Before, after…

Previous Paths & Destinations



Current Paths & Scripts



Questions?