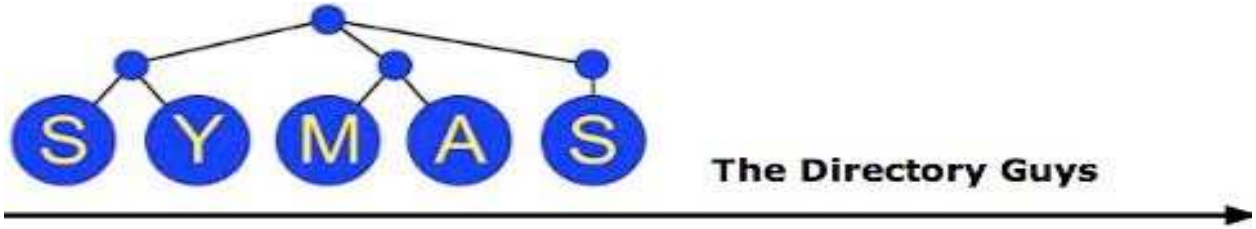

OpenLDAP Development

Setting a Course for the Enterprise

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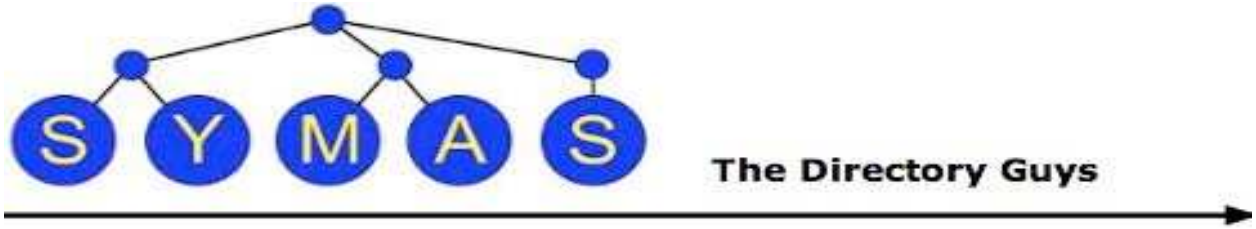
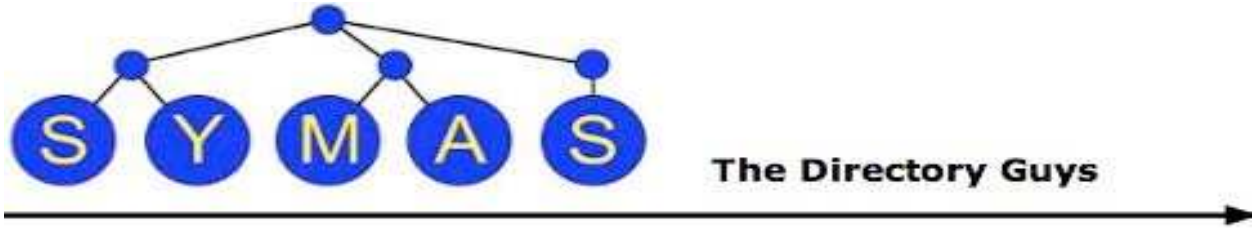
ODD/Tuebingen October 13, 2006



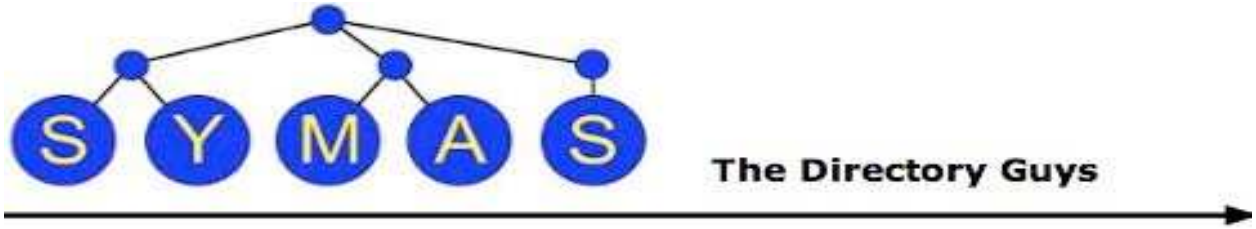
Status Summary

- Progress since ODD 2004
  - Many more useful overlays
  - Mostly complete back-config
- New developments
  - Syncrepl enhancements
  - Performance, further refactoring



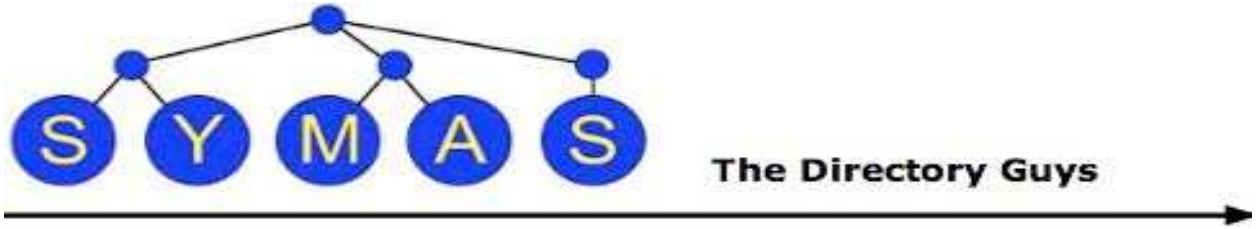
Overlay Status

- Goals met since 2004
  - More backend entry points handled
  - SLAPI reimplemented as an overlay
  - backglue reimplemented as an overlay



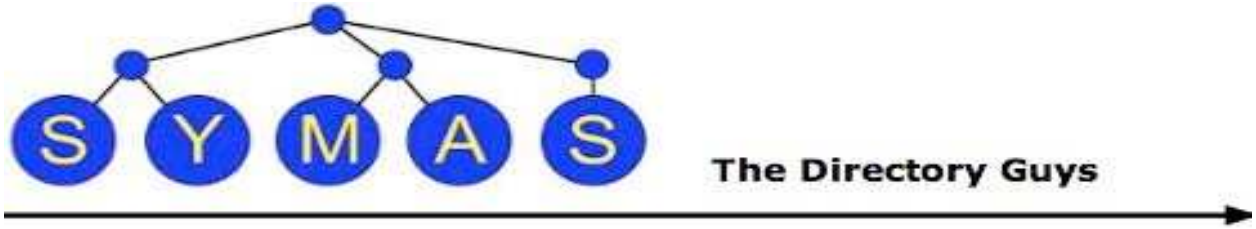
Overlay Status (2)

- Enterprise-oriented features
  - In-directory password policy
  - Referential integrity
  - Translucency
  - Attribute uniqueness
  - Value sorting
  - In-directory logging



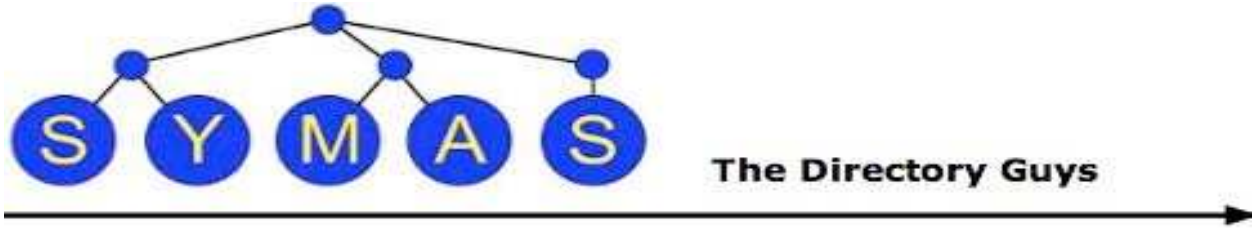
Overlay Status (3)

- Conclusions
  - Overlays have met their design goals
  - Overlays continue to improve incrementally



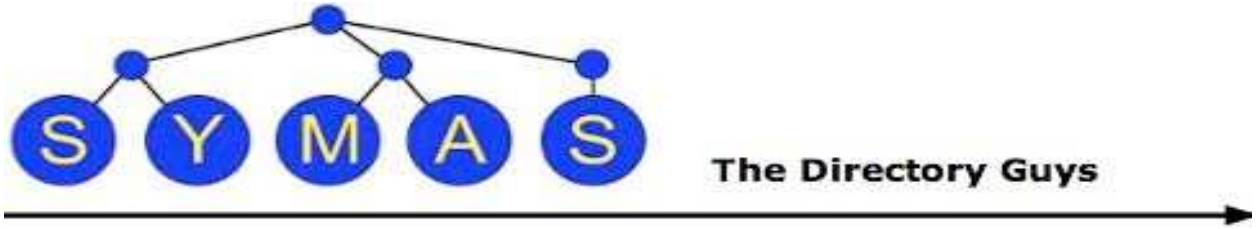
CN=config Status

- Goals met since 2004
  - Converted config.c to table-driven mechanism
  - Maintained backward compatibility with existing slapd.conf syntax
  - Fully dynamic capability for majority of config items
    - ACLs
    - Schema
    - Databases
    - DB indexing
    - Dynamic modules



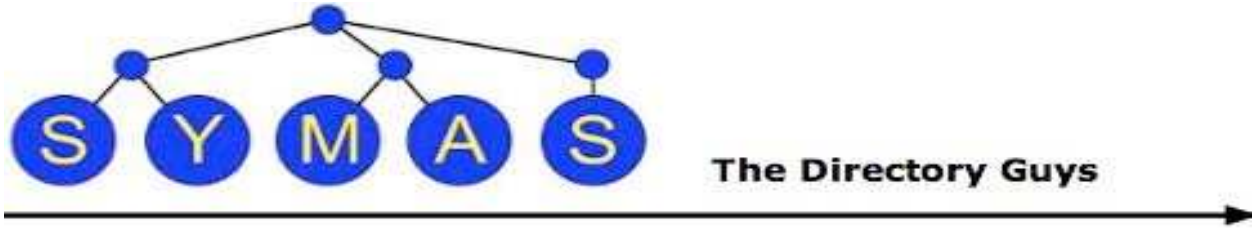
CN=config Future

- Zero administrative downtime
  - dynamically replace/re-exec binaries
- Fine-grained syncrepl for shared configuration components
- config_entry API
  - allow backends/overlays to access their own config entries and persist private state
- Your suggestions welcome...



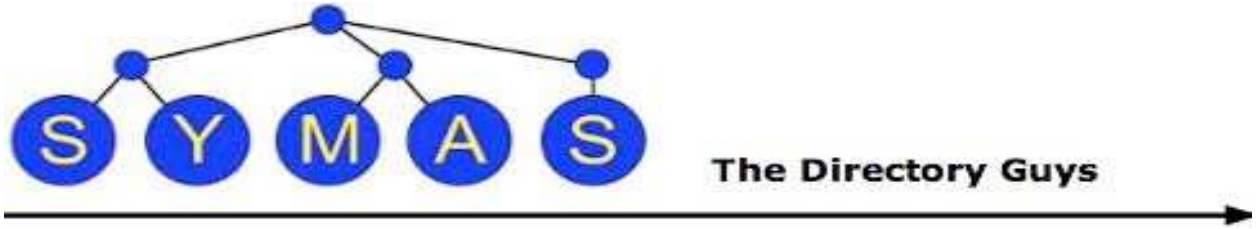
New Developments

- Syncrepl enhancements
  - Delta-syncrepl
  - Push-mode syncrepl
  - Mirrormode
- Upcoming work
  - lessons learned from deployment, ITS's



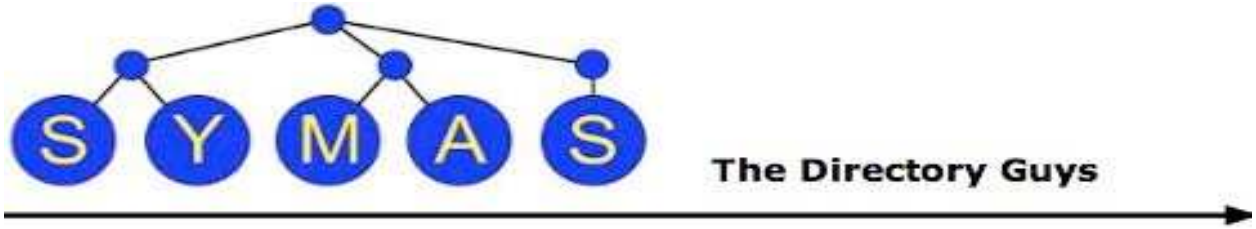
Syncrepl

- Delta-syncrepl
  - Addresses bandwidth concerns from plain syncrepl
  - Relies on a persistent log of changes
  - Ordering of log entries is fully serialized; no out of order updates
  - Automatic fallback to plain syncrepl if consumer loses sync with log



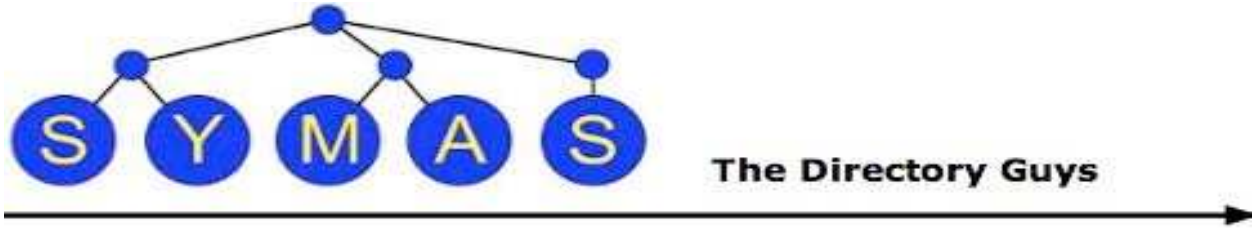
Syncrepl...

- Push-mode syncrepl
  - Just a syncrepl consumer sitting on back-ldap
  - Can add a customization overlay for mapping the contextCSN to a suitable remote attribute, or to store the contextCSN locally
  - Provides a simple, robust, dynamically configurable replacement for slurpd



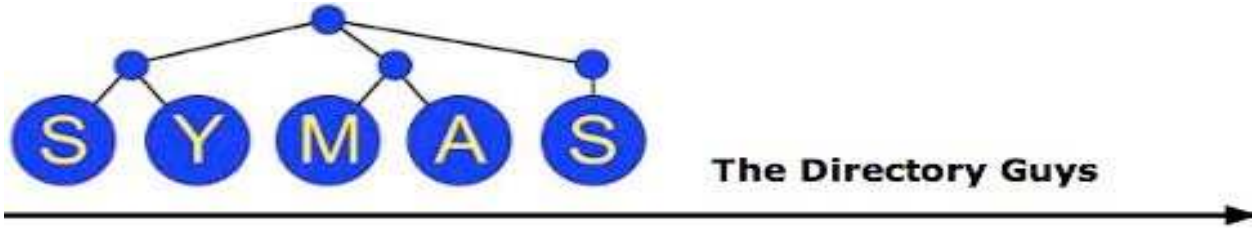
Syncrepl...

- Mirrormode
  - Allows a single active master and many standby masters
  - Preserves single master consistency while allowing automatic promotion of alternate masters
  - Requires use of an external frontend to guarantee that writes are only sent to a single master at a time
  - Addresses the high availability/SPOF concerns with minimal fuss
  - Already in use at some Symas customer sites



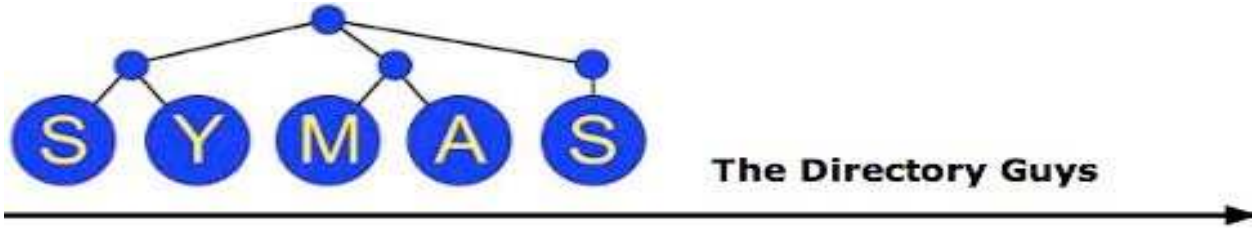
Syncrepl...

- Revive support for multiple consumers/contexts in a single DB context
  - required for meaningful glue behavior
  - touches on multimaster consistency issues
    - requires synchronized clocks for all contexts
    - requires use of hostID field of CSN
    - requires per-consumer contextCSNs in addition to (*not instead of*) provider contextCSN



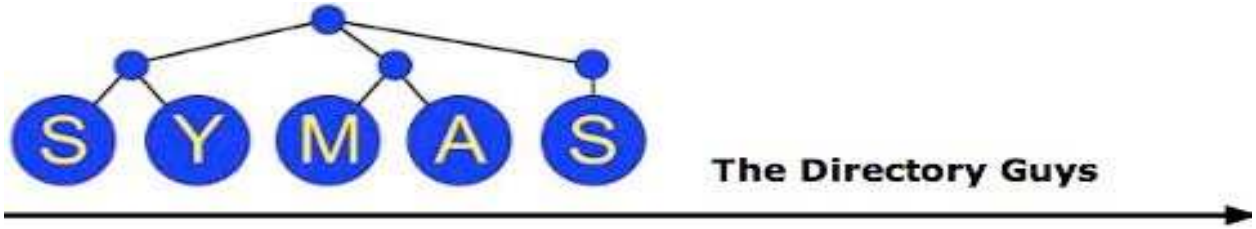
Performance

- Fixed Lightweight Dispatcher
  - eliminated unnecessary locking in connection manager
    - slapd-auth test against back-null yielded over 32000 binds per second on 100Mbps ethernet
    - over 128000 frames per second - ~90% of available bandwidth – essentially saturated
    - No other LDAP server we tested delivers this speed on identical hardware



Performance...

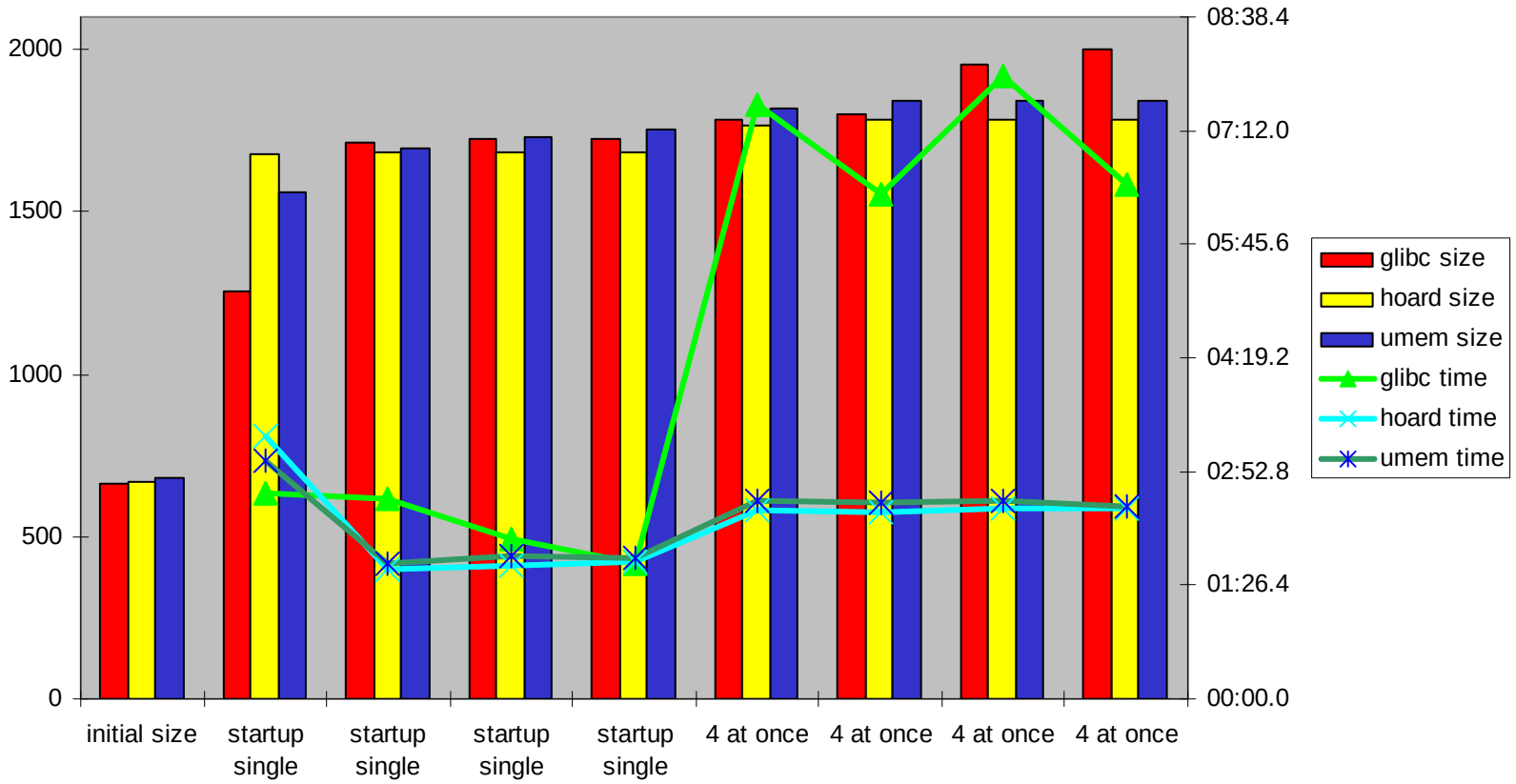
- Fixes to pcache (proxy cache) overlay
  - Fixed O(n^2) query containment behaviors
  - Optimized case where a single entry is expected
  - Added negative caching support
  - Results:
    - pcache used to be slower than a direct proxy lookup above about 500 queries
    - pcache is now always faster than passing through



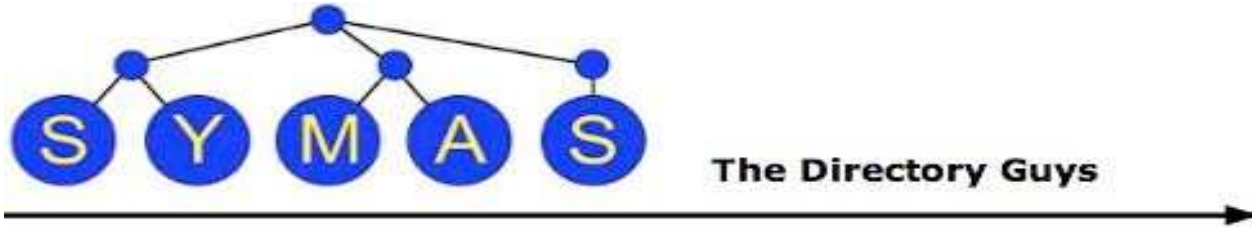
Performance...

- libc malloc() still has a major impact
  - refactored Entry and Attribute management to further reduce number of calls to malloc
  - using a thread-oriented allocator like hoard provides further advantages

malloc Performance

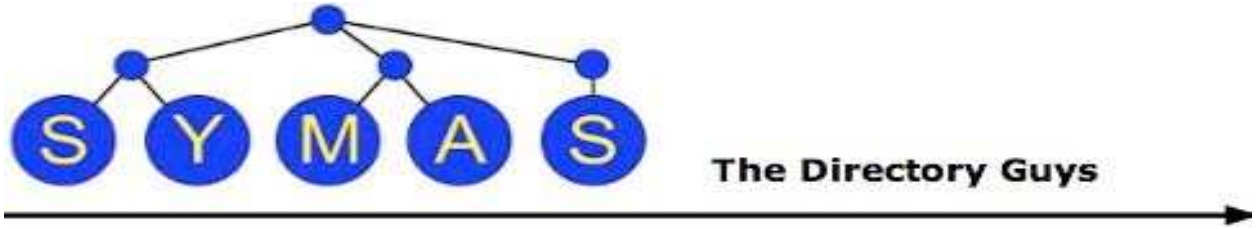


see openldap–devel August 30 2006...



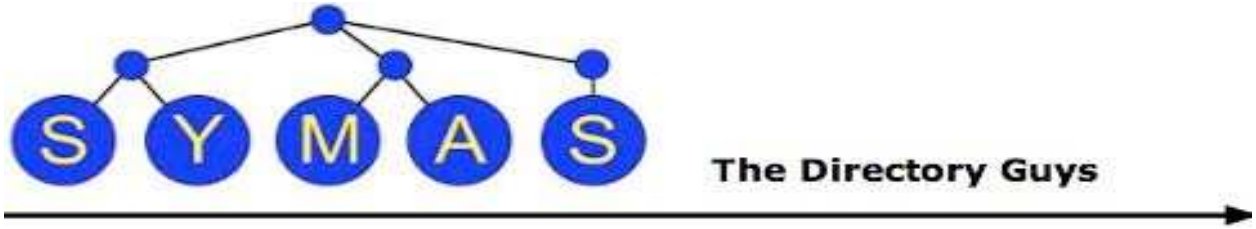
malloc Performance

- Tested on 2.6 Linux kernel with glibc 2.3.3
- Results will obviously vary by platform
- glibc malloc does not handle tight memory conditions gracefully
- libumem is good but libhoard is better
  - performance difference is minimal
  - umem on non-Solaris appears unmaintained



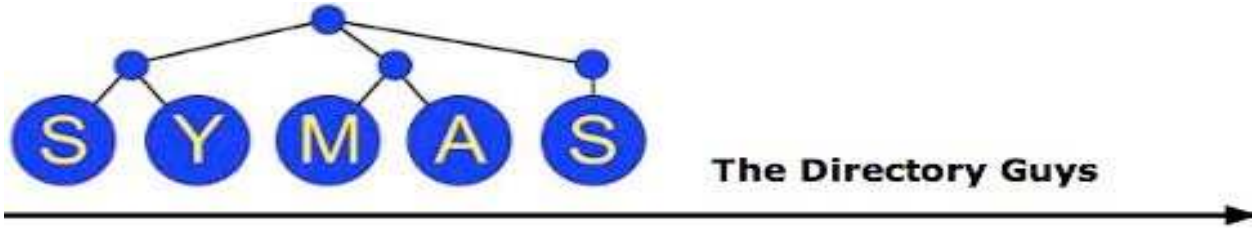
Performance...

- Scaling to large deployments
  - Demonstrated performance at over 150 million entries
    - November 2005: 16600 queries/second, 3400 updates/second
    - April 2006: 22000 queries/second, 4800 updates/second
  - Over 1 terabyte of real data
  - Other popular directories' claims of scaling are provably false
    - Several other products were tested with the same data, all of them failed
    - Only OpenLDAP passed



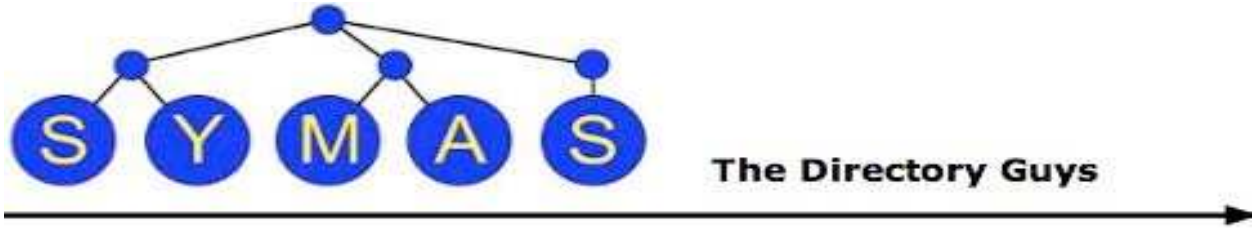
Performance...

- benchmark details available on www.symas.com
- we may want to consider investing effort in a C-based benchmarking framework
  - existing frameworks are not credible
    - DirectoryMark in perl, fast enough to measure slow directories, not fast enough for OpenLDAP
    - SLAMD in java, same story again



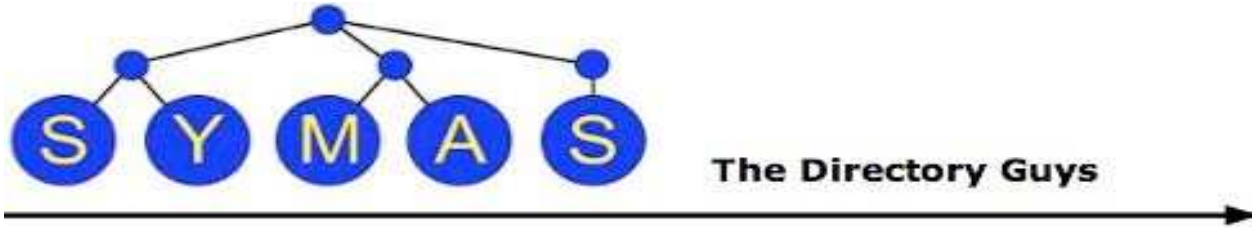
A Word from Our Sponsors

- OpenLDAP is no longer only of interest to a handful of developers
  - Significant investment from Symas, HP, Sys-Net, Sendmail (pcache), others.
  - Is now running all of HP's corporate IT, displacing previous proprietary server
  - Feature wise, performance wise, there is no credible competition



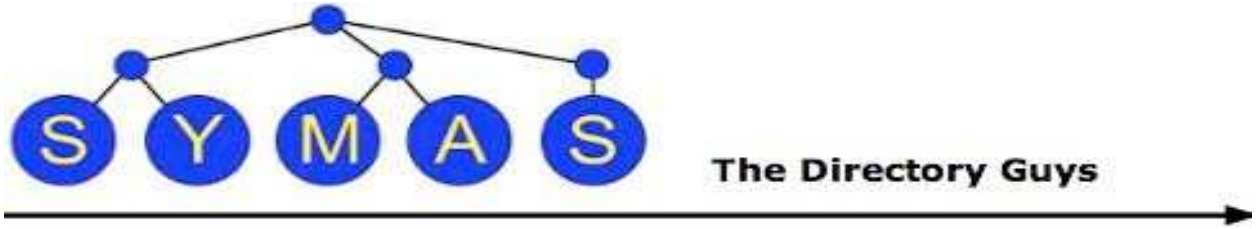
The Road Ahead

- The unmatched code quality is not matched by documentation quality
  - Working on OpenLDAP Admin book, to be published by Addison-Wesley in Spring 2007
  - The manpages need to be fleshed out, missing pages need to be written



The Road Ahead...

- More work on back-config
- Work on scale-out, vs scale-up
  - allow multi-terabyte DBs to be served without requiring a single giant server
    - page-oriented, lock-free DB to allow multiple backends to serve portions of a single shared DB
    - distributed indexing
    - cluster-friendly optimizations



Final Thoughts

- OpenLDAP is taking over the enterprise
  - reliability, flexibility, scalability beyond all users' or competitors' comprehension
- The OpenLDAP community continues to thrive
  - with special thanks to the corporate members of the community
- Code quality is self-evident, but needs to be balanced with documentation quality