Ultrix Distributed System Management

Tuesday, May 5, 6PM

Summary

- Configuration Features
  - centralized, high-integrity database
  - maintains a consistent login environment on sets of nodes
  - supports reinstallation of state after a node crash
- Monitoring Framework Features
  - Server support for arbitrary metrics
  - Client support for a variety of displays
  - Archiving and playback
  - Threshold event notification and script invokation
- Application Features
  - Motif applications with context-sensitive help
  - password file and group file
  - fstab and exports file
  - automount and nfs configuration
  - cpu, io, filesystem utilization statistics

Design Center

- Monitoring and Configuration
- 100's of Unix systems on a LAN (scaleable to 1000's)
- Configuration based on Athena Moira (aka SMS) model
- Monitoring based on UI/OSF PMWG model
- All protocols based on NCS RPC 1.5

Configuration

Model / Architecture

- Picture / How it works
- How we support Scaleability
  - Relational database supports large configurations
  - Only the front-end's access the database
  - Delegation service updates 100s of nodes
  - How name servers fit in
  - Per-node work (servers) are simple and quick
- Benefits of a database-centric model
  - A network-wide resource
  - Central control, backup and security
  - Data survives node failures and reinstallations
  - Allows rationalization of a network of scattered config data
  - Allows single point of integration with customer data
  - Allows common definition of resources for the whole network
- Customizability
  - Integration with the database

- — User-defined data with system management objects
- — Can control server update frequency
- — User-provided script execution at server

- Consistency
  - — The problem: the database vs what's on the node
  - — Causes:
    - . initial installation
    - . changes to management files out-of-band
    - . node wiped out
    - . updates in progress lost due to disk failure
  - — Solutions:
    - . bulk load - update database from a file
    - . database reload - update database from changes at node
    - . system reload - update system from database

- Comparison with Moira
  - — front-end applications: moira: simple, full sail: motif gui
  - — name servers: moira: integral part, full sail: optional

- node update control: moira: course, full sail: fine
- node update frequency: moira: scheduled, full sail: real-time

Framework and Services

- System Management Database
  - Exports a simple relational data service
  - Enhanced integrity unique attributes record versions referential integrity unique record identifiers
  - Record-level access control
  - Run-time table creation
  - Structured and unstructured storage
  - Central license repository
- Database Executive Library
  - Hides database protocol
  - One common set of correct, optimized queries
  - Application meaningful objects and abstractions
  - Point of application data integation
- Policy Manager
  - Systems and their attributes
  - Management sets monitoring domains security and application delegation consistent environments
  - Application ACLs

- — Application integration
- Batch Processor
  - — Constructs server update messages
  - — Runs in real-time
  - — Only the objects which have changed are updated
- Delegation Service
  - — 1-to-many RPC
  - — retries if server not available
  - — Supports any NCS RPC server without recompilation
  - — Can enforce ordering of updates
- Servers
  - — A network interface to the management files
  - — passwd, group, fstab, exports
  - — may manage a nameserver
  - — guarantees updates are atomic
  - — user provided script invokation

Monitoring

Model / Architecture

- Picture / How it works
- Network optimization (scaleability)
  - data transfered only when display is visible
  - server will resend data which client is missing apon re-display
  - small messages clustered together
  - calculations done on server to avoid extra traffic
  - asynchronous event notification to avoid polling
- Customizability
  - Users can bind any graph to any metric
  - Server supports transparent addition of new metrics
  - Users can define their own thresholds
  - User-provided script invokation at threshold crossing
  - Per-client archiving can be done as each client desires

Framework and Services

- The generic client
  - Displays bar graph strip chart XY plot dial kiviat graph pie chart sorted list
- The filesystem client
  - sorted list of disk storage utilization
- The generic server
  - collections
  - thresholds
  - archives
- Event Notification Service
  - Used primarily for notification of server transitions
  - producers and consumers
  - scaleable in number of producers
  - consumers notified via a signal
  - reduced network messages

Applications

- pure Configuration
  - Account Manager /etc/passwd /etc/group YP and BIND distribution of passwd and group home directory population
- pure Monitoring
  - Performance Monitor
- hybrid
  - FileSystem Manager /etc/fstab /etc/exports auto-mounter NFS configuration mount / unmount
  - FileSystem Monitor

Futures

- Security
- Hetergeneity
- GUI and server re-useability
- Standards compliance