





Tivoli Storage Network Manager Technical Overview

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Tivoli Storage Management Solutions

- Tivoli Storage Manager (TSM)
 - Backup Solutions
- Tivoli SANergy
 - File Sharing
- Tivoli Storage Network Manager (TSNM)
 - Storage Network Discovery, Monitoring, LUN Management and Automation
- Tivoli Storage Resource Director
 - Active Storage Resource and Data Management

Integrated with Tivoli Systems management and IBM Storage management solutions !!

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TSNM Architecture

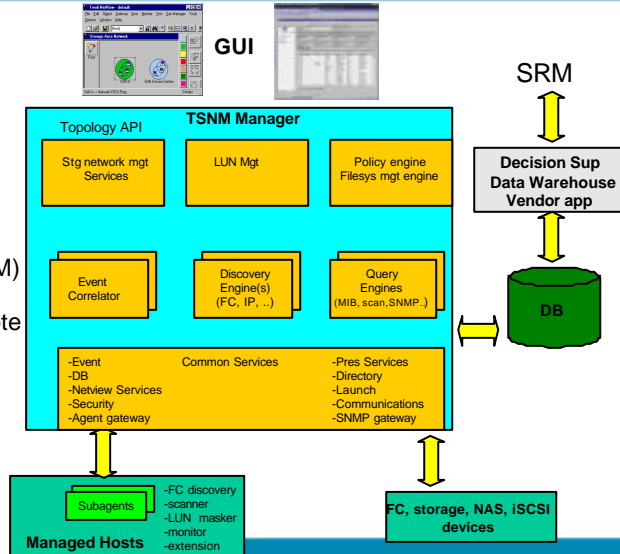
Built upon common Tivoli services (Presentation Services, Netview, etc)

Element managers launched from the common console

APIs available to enable other solutions (reports, data mining, trend analysis, SRM)

Discovery/monitoring via remote agents and SNMP (full support for T11 FC-MI)

Easily extensible to new technologies



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TSNM Network Management

- Network Management provides physical and logical SAN discovery, monitoring, and management
 - Discovers and presents the SAN physical and logical topology (using inband and outband mechanisms)
 - Topology, logical, and zone views
 - Device and fabric element configuration/state information
 - Continuous monitoring and fault isolation
 - Launches vendor-provided management applications
 - Reporting and analysis via Tivoli Decision Support and Tivoli Data Warehouse

Lowering cost of storage network administration
Improved availability of storage resources

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TSNM Network Management

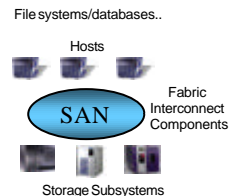
- Comprehensive **Discovery** using FC-GS, SCSI, SNMP standards
 - ANSI T11 FC-MI standard defines Tivoli Ready for SAN Mgt
 - Combination of inband FC standards provides device and topology discovery, node information, IP addresses, URLs
 - Name server, Management server, Request Node Identification Data (RNID), Register Topology Information (RTIN), Platform registration
 - Inband SCSI queries provide device attributes, *copy services*, *LUN control*
 - Outband SNMP MIB queries provide device and topology discovery, device attributes, etc
 - Fabric Element MIB, FC Management MIB
- Continuous, proactive **Monitoring** of network and components
 - Receives, correlates, propagates SNMP alerts
 - In-band queries allow monitoring of configuration changes, link errors, device/component status, *performance*
 - Request State Change Notification (RSCN), Link Incident Record Registration (LIRR), Registered Link Incident Record (RLIR), Scan Remote Link (SRL), Read Port Status (RPS)
 - Outband SNMP MIB support for health and performance monitoring
- **Launch** of device management applications

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TSNM LUN Management Security

- Without SAN LUN management, hosts have unlimited access to storage devices (LUNs); security is needed:
 - File systems, databases..provide data access
 - Device driver LUN masking
 - Fabric LUN masking is vendor specific and most zoning solutions are at port level (not LUN level)
 - Storage subsystem solutions are vendor specific and unintelligent disk don't provide LUN security
- Storage Network Manager - Disk Management
 - Discovers and attaches open system disk volumes (LUNs) in the SAN to one or more host systems
 - Hosts cannot access or see disk volumes that are not attached to it
 - Employs device driver LUN masking techniques to accomplish this task
 - Control point for automation



Protection of customer's assets
Improved productivity

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File System Policy Management

- Extends the functions of Disk Management
- Monitors file system capacities
- Automatically assigns additional SAN storage in an out of space condition
 - Policy driven for automatic, consistent management
 - Hierarchically based policy inheritance

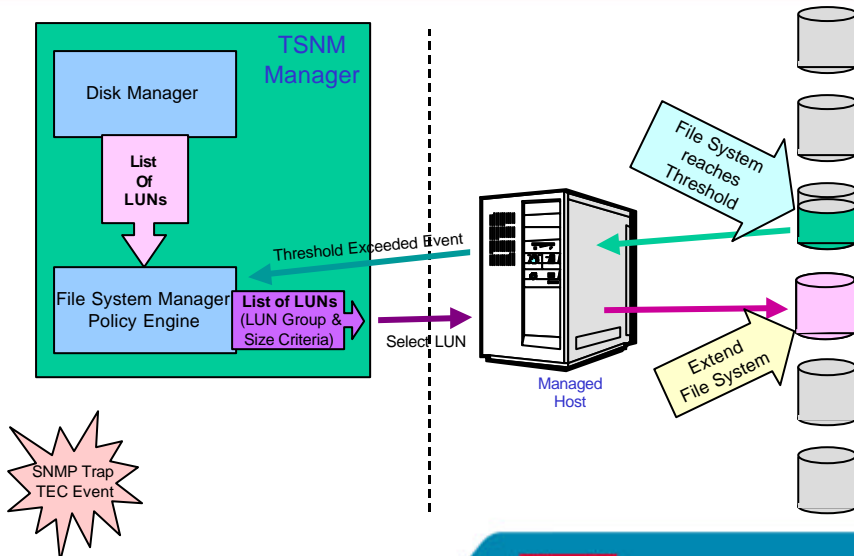
Capacity on Demand!

Automation

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File System Automation Scenario



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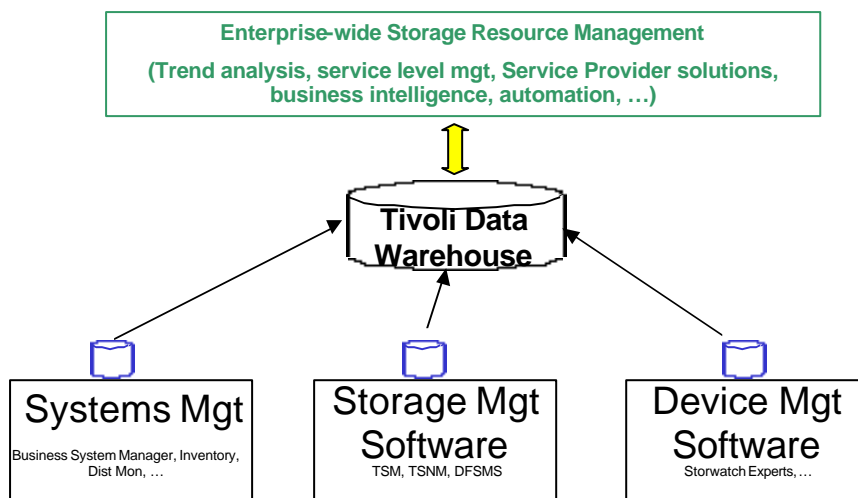
TSNM Futures

- Deliver robust, comprehensive solutions
 - Embrace new storage networking technologies (FC, iSCSI, NAS, z-series mgt)
 - Incorporate virtualization mappings
- Lower cost of management through improved availability and performance
 - Improved error detection, event correlation and fault isolation assists based on IBM Research (SRL, FC Mgt MIB enhancements, error modeling, ..)
 - Automatic, pro-active diagnostics
 - Performance, scalability, usability improvements
 - SAN performance monitoring (RPS, SNMP MIBs)
- Enables higher value solutions
 - Key enabler of SRM solutions
 - Application/business view
 - Cross product awareness, participation
 - Continued policy participation

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Tivoli Data Warehouse



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TSNM Architectural Summary

- TSNM provides robust storage network management functions
- TSNM lowers storage administration costs with automatic topology discovery, SAN monitoring, and consistent network mgt interface
- TSNM supports business continuance by avoiding out of space conditions
- TSNM enables other storage network exploitation solutions