



Planning and implementing IBM Tivoli Storage Manager



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Planning and implementing ITSM Overview

In this course we shall discuss:

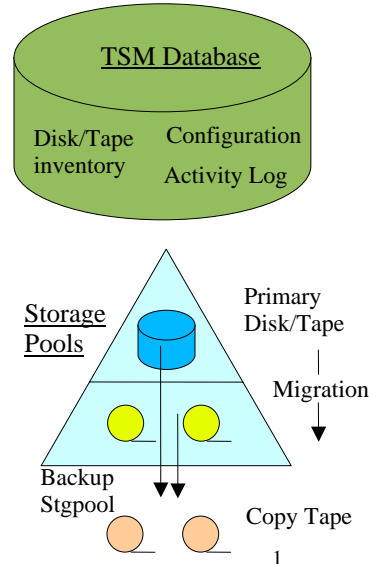
- Requirements gathering
- Sizing an ITSM server
- Developing an ITSM design
- Implementation
- **Post-implementation**

Planning and implementing ITSM **iBK** Requirements gathering



Explain basic ITSM features

- **Network and LAN-Free backup**
 - Progressive incremental
- **TSM Database**
 - Allows sophisticated data retention policy
- **Storage pool heirarchy**
 - Isolates data location from retention policy
- **Progressive incremental backups**
 - Policy controls retention by versions/days
- **Archives and Backup sets**
- **TDP for application backup**
- **Administrative and client interfaces**



Planning and implementing ITSM **iBK** Requirements gathering



Why do we perform backups?

- **Ad-hoc restores**
 - Relatively small impact, minimal data size
 - Driven by Helpdesk or end-user
 - Easy of use a priority
- **Disaster recovery**
 - On-site (single system, or disk, failure)
 - Off-site (total site failure, or "other")
 - Driven by System Administrator and business
 - Restore performance a priority
- **Long-term Archival**
 - Business/Regulatory requirements
 - Driven by Business (legal, finance) or auditors
 - Long term retrieval a priority

Airport burglary sparks security alert
By Philip Cornford (<http://www.theage.com.au>)

On the night of Wednesday, August 27, two men dressed as computer technicians and carrying tool bags entered the cargo processing and intelligence centre at Sydney International Airport.

...

After supplying false names and signatures, they were given access to the top-security mainframe room. And they knew where to go.

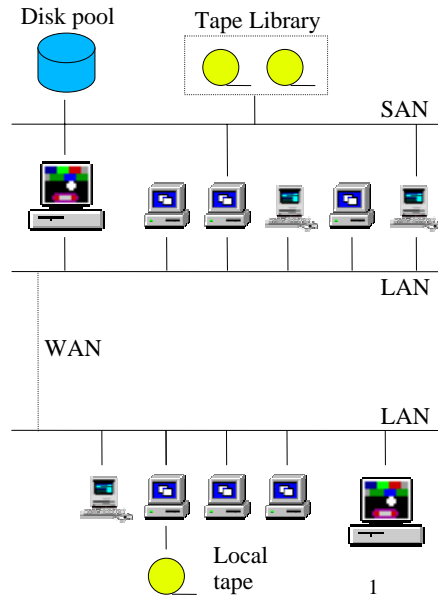
They spent two hours disconnecting two computers. They put them on trolleys and wheeled them past the security desk, into the lift and out of the building.

Planning and implementing ITSM **iBK** Requirements gathering



Connectivity

- **Single/Multiple sites?**
- **Network specifics**
 - LAN speed
 - Shared or private “backup” LAN
 - 100 Mb, 1 Gb
 - WAN speed
 - 64 kb, 2 Mb, 10/100 Mb +
 - Routers, firewalls, etc
- **SAN specifics**
 - Scope
 - All/subset of clients?
 - Speed
 - 1 Gb, 2 Gb



Planning and implementing ITSM **iBK** Requirements gathering



Backup requirements

- **Filesystem backups**
 - OS, application binaries, data
 - Number of client nodes
 - Total number of files and size
 - Daily change rate
 - Average file size
 - Do we backup "open files"
- **Retention policy**
 - How to differentiate data
 - Management classes
 - Versions existing
 - Versions deleted
 - Retain extra
 - Retain only

| Host | Role | TSM nodename | | | | Stg Agent |
|------------|---------------|--------------|-------|-------|-------|-----------|
| | | B/A | Ora | Exch | SQL | |
| MOBY | TSM server | *_FS | | | | N/A |
| MINNOW | Retail DB | *_FS | *_SID | | | |
| PIKE | CMS | *_FS | *_SID | | | *_SA |
| BLUEEYE | Exchange | *_FS | | *_XCH | | |
| KIPPER | NEM DB | *_FS | *_SID | | | |
| MARLIN | Exchange | *_FS | | *_XCH | | *_SA |
| TUNA | Web server | *_FS | | | | |
| SALMON | File/Print | *_FS | | | | N/A |
| HALBUT | NT4 BDC | *_FS | *_SID | | | *_SA |
| WHITEBAIT | Exch IMS | *_FS | | | | |
| JELLY | ISA server | *_FS | | | | |
| GREATWHITE | FileP. DB | *_FS | *_SID | | | |
| HAMMERHEAD | Y2K FDC | *_FS | | | | |
| GREYNURSE | Y2K BDC | *_FS | | | | |
| ANGEL | MP3 Server | *_FS | | | *_SQL | *_SA |
| GRUNTER | IDS | *_FS | *_SID | | | |
| BASS | WMD dev | *_FS | | | | |
| FLATHEAD | Quake server | *_FS | | | | |
| MULLETT | HoneyPot | *_FS | | | *_SQL | |
| CAT | Citrix server | *_FS | | | | |
| GOBY | Citrix server | *_FS | | | | |
| CARP | Primus DB | *_FS | *_SID | | | *_SA |
| COD | Print server | *_FS | | | | |
| RAINBOW | Treasury DB | *_FS | *_SID | | | |
| BARRACUDA | Treasury App | *_FS | | | | |
| Totals | | 25 | 8 | 2 | 2 | 4 |

Planning and implementing ITSM Requirements gathering



Backup requirements

- **Application backups**
 - TDP support
 - May actually be “archives”
 - Application specific methods
 - Shutdown and backup
 - On-line via logging mode
 - On-line export to file
 - LAN or SAN backup
- **Meta-data backups**
 - Active Directory
 - Novell NDS
- **Retention policy**
 - Management classes

| Client Type | Name | VE | VD | RE | RO | Destination |
|--------------------|-------------|----|----|----|------|--------------|
| File/Print server | bkup_fnp_mc | NL | NL | 56 | 1825 | pri_fnp_disk |
| Citrix server | bkup_ctx_mc | NL | NL | 7 | 1825 | pri_ba_disk |
| Active Dir server | bkup_ade_mc | NL | NL | 35 | 1825 | pri_ba_disk |
| Application server | bkup_app_mc | NL | NL | 28 | 1825 | pri_ba_disk |
| Ancillary server | bkup_anc_mc | NL | NL | 14 | 1825 | pri_ba_disk |
| DR listed servers | bkup_dr_mc | NL | NL | 56 | 1825 | pri_dr_disk |

| Client Type | Name | VE | VD | RE | RO | Destination |
|-----------------|--------|----|----|----|------|--------------|
| All directories | dir_mc | NL | NL | 56 | 1825 | pri_dir_disk |

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Archive requirements

- **Filesystem archives**
 - OS, application binaries, data
 - Entrie node, or selected files
 - Total number of files and size
 - Do we archive "open files"
- **Frequency**
 - Weekly/Monthly/Yearly
 - Access/retrieval frequency
 - Are backup sets suitable
- **Retention policy**
 - Frequent, long term, archives are a common cause of rapid ITSM database growth
 - Management classes
 - Retain days

| Archive Type | Name | Retention | Destination |
|--------------|----------------|-----------|-------------|
| 1 month | arch_1month_mc | 90 | pri_ba_disk |
| 3 months | arch_3month_mc | 105 | pri_ba_disk |
| 1 year | arch_1year_mc | 365 | pri_ba_disk |
| 7 years | arch_7year_mc | 2555 | pri_ba_disk |

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Archive requirements

- **Application archives**
 - TDP support
 - May actually be “backups”
 - Application specific methods
 - Shutdown and archive
 - On-line via logging mode
 - On-line export to file
 - Dump to CSV files
 - LAN or SAN archive
- **Frequency**
 - Weekly/Monthly/Yearly
 - Access/retrieval frequency
- **Retention policy**
 - Management classes

| App | Name | VE | VD | RE | RO | Destination |
|-----------|-------------------------|----|----|------|------|-------------------|
| Oracle | tdp_ora_data_mc | 1 | 0 | 0 | 0 | pri_tdp_tape |
| Exchange | | | | | | |
| - Daily | | | | | | |
| - Data | tdp_xch_data_mc | NL | NL | 56 | 56 | pri_tdp_data_tape |
| - Log | tdp_xch_log_mc | NL | NL | 56 | 56 | pri_tdp_log_disk |
| - Meta | tdp_xch_meta_mc | NL | NL | 56 | 56 | pri_tdp_meta_disk |
| - Monthly | | | | | | |
| - Data | tdp_xch_data_monthly_mc | NL | NL | 365 | 365 | pri_tdp_data_tape |
| - Log | tdp_xch_log_monthly_mc | NL | NL | 365 | 365 | pri_tdp_log_disk |
| - Meta | tdp_xch_meta_monthly_mc | NL | NL | 365 | 365 | pri_tdp_meta_disk |
| - Yearly | | | | | | |
| - Data | tdp_xch_data_yearly_mc | NL | NL | 1825 | 1825 | pri_tdp_data_tape |
| - Log | tdp_xch_log_yearly_mc | NL | NL | 1825 | 1825 | pri_tdp_log_disk |
| - Meta | tdp_xch_meta_yearly_mc | NL | NL | 1825 | 1825 | pri_tdp_meta_disk |
| MS-SQL | | | | | | |
| - Daily | | | | | | |
| - Data | tdp_sql_data_mc | NL | NL | 56 | 56 | pri_tdp_data_tape |
| - Log | tdp_sql_log_mc | NL | NL | 56 | 56 | pri_tdp_log_disk |
| - Meta | tdp_sql_meta_mc | NL | NL | 56 | 56 | pri_tdp_meta_disk |
| - Monthly | | | | | | |
| - Data | tdp_sql_data_monthly_mc | NL | NL | 365 | 365 | pri_tdp_data_tape |
| - Log | tdp_sql_log_monthly_mc | NL | NL | 365 | 365 | pri_tdp_log_disk |
| - Meta | tdp_sql_meta_monthly_mc | NL | NL | 365 | 365 | pri_tdp_meta_disk |
| - Yearly | | | | | | |
| - Data | tdp_sql_data_yearly_mc | NL | NL | 1825 | 1825 | pri_tdp_data_tape |
| - Log | tdp_sql_log_yearly_mc | NL | NL | 1825 | 1825 | pri_tdp_log_disk |
| - Meta | tdp_sql_meta_yearly_mc | NL | NL | 1825 | 1825 | pri_tdp_meta_disk |

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Planning and implementing ITSM Requirements gathering



Service Level Agreements

- **They don't have any?**
 - Of course they do...
- **Does the ITSM server require high availability**
- **Backup windows**
 - Filesystem backups
 - Progressive incremental
 - Application backups
 - Full / Incremental
 - Filesystem archives
 - Full / Subset of filesystem
 - Application archives
 - Full archive
- **Restore performance**
 - Ad-hoc restores
 - Interactive, not urgent
 - Space migration recall
 - Interactive, urgent
 - Disaster recovery
 - urgent, business critical
 - Long term Archive retrieval
 - not urgent, highly visible

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Requirements gathering

Customer environment

- **Hardware environment**
 - How many tape drives in the library
 - Do they have a tape library?!
- **Software environment**
 - Operating system types, version numbers, patch levels
- **Staff availability**
 - What level of skill do the regular operators possess?
 - Consider automating day-to-day operational tasks
 - How often will the off-site DR tape movement occur?
- **Anticipated growth**
 - Existing systems, and upgrades
 - New systems, business acquisitions

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Requirements gathering

Explain ITSM requirements

- **Software versions**
 - Operating System platforms, versions and patch levels
 - Does ITSM support the required features on these platforms?
 - Application versions and patch levels
 - Are there planned upgrades to unsupported versions?
- **Hardware devices and configuration**
 - Tape library and drives
 - Appropriate numbers, capacity, and performance
 - TSM disk capacity
 - Storage pools, Database, and Recovery log
 - SAN configuration
 - All tape drives must be visible for LAN-free clients
 - Configure "persistent LUN binding" for Storage Agent clients

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Sizing an ITSM server

Sizing guidelines

- *Involves CPU, disk capacity, number and type of tape drives, network bandwidth, etc*
- *Need to cater for the peak load (backup and restore)*
 - *May be offset by good schedule design*
 - *Remember to cater for anticipated growth*
- *Performance will be limited by the slowest component*
 - *Often the slowest component is the client's disk*
- *Sizing is intimately linked to performance tuning*
 - *Implement “best practice” tuning during implementation*

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Sizing an ITSM server

CPU and memory sizing

- *Not usually the limiting factor on an ITSM server*
 - *Expiration is often the main CPU hog*
 - *Database buffer pool is the main memory hog*
- *Higher throughput will increase CPU utilization*
 - *Use jumbo frames when using Gigabit ethernet*
 - *Remember LAN-Free clients will reduce CPU load on the server*
- *TSM makes good use of multiple CPU's*
 - *Consider a 2-4 way SMP server*
 - *Note some tasks (database unload/load) are single threaded*



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Sizing an ITSM server

Disk storage sizing

- **ITSM database**
 - Size is proportional to the total number of stored files
 - Allow twice as much if using ITSM database mirroring
 - Possibly allow for TSM database backup to file
- **Recovery log**
 - Normal mode: Small log, cleared when transaction completes
 - Roll forward mode: Large log, retains transactions until DB backup
- **Disk/File storage pools**
 - Determine how much data stages to disk, and how much goes directly to tape (Eg. filesystem vs. database backups)
 - Should be large enough to accept a typical days backup without migrating to tape (allow for variation and growth)
 - Consider using client compression to reduce disk requirements



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Sizing an ITSM server

Tape library and drive sizing

- **Plan for peak load**
 - Include spare capacity to allow for failure
 - Allow for anticipated growth
- **Consider tape library internal slot capacity**
 - Allow some room for scratch tapes (5-10%)
 - Typical storage pool volume efficiency (60-90%)
- **Client tasks**
 - Scheduled and ad-hoc client backup
 - Urgent client restores (DR)
- **Administrative tasks**
 - Backup storage pools (Simultaneous write?)
 - Migration, Reclamation (Primary and Copy pools)
 - Backup TSM database (Full and Snapshot)



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Sizing an ITSM server

Connectivity sizing

- **Shared business LAN**
 - Backups may compete with other business users
 - Beware of “auto detect” LAN adapters and switches
- **Private backup LAN**
 - Dedicated LAN for ITSM backup purposes only
 - Ensure clients use the correct “hostname” for the backup LAN
 - Configure the “tcpclientaddress” for server prompted schedules
- **SAN configuration**
 - Separate HBA for disk/tape traffic
 - Number of tape drives per HBA
 - Minimize ISL traffic



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Planning and implementing ITSM

Developing an ITSM design

Use appropriate features and configurations

- **Plan your design around TSM's strong points**
 - TSM is not [arcserve | ntbackup | tar | cpio | dump | legato | netbackup | ...]
 - So don't try to make it emulate them
- **Filesystem backup type**
 - Progressive incremental, Journal based, Sub-file, Archives, Backup sets
- **Application backup type**
 - On-line backup (application specific, or TDP agent)
 - Off-line backup (file-level backup of quised data files)
- **Data path**
 - Network backup (100Mb, 1Gb)
 - LAN-Free, SANergy, Server-Free

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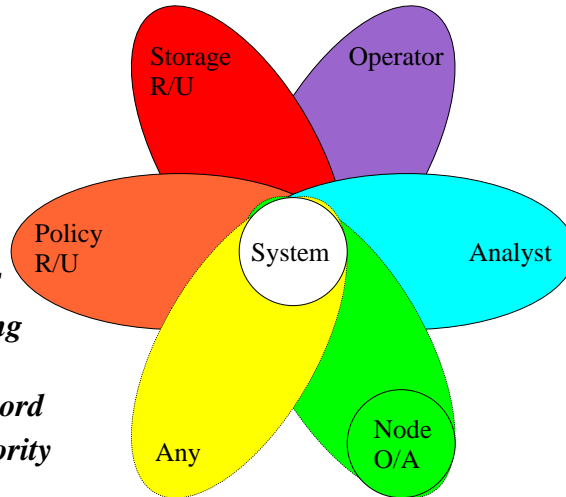


Client accounts

- **Standard naming**
 - *nodename_fs*
 - *nodename_fs_ltb*
 - *nodename_ora_sid*
 - *appname_instance*
 - *cluster_appname*

Administrative accounts

- **Strongly consider using the secure web proxy**
- **Change default password**
- **Delegate limited authority**



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Policy domain/s

- **How many and why?**
- **Useful as a level of administrative access control**
- **Consider creating identical policy domains for Test/Dev/Prod clients**

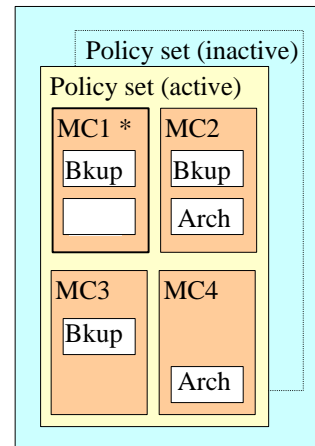
Policy set/s

- **Typically one Active/inActive policy set pair**
 - *Multiple inActive policy sets are possible*

Management classes

- **Derived from the businesses SLA**

Policy domain



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Planning and implementing ITSM

Developing an ITSM design

Management classes – Backup

- Allows us to treat different data differently
 - Vary retention parameters to suit business requirements
 - Vary initial storage pool destination
 - Control grouping (collocation) of client backups in storage hierarchy

| | Temp | Default | Critical | RMAN | Domino | |
|----|------|---------|----------|------|--------|----------|
| VE | 3 | 10 | NL | 1 | NL | Versions |
| VD | 1 | 3 | NL | 0 | NL | Versions |
| RE | 7 | 35 | 90 | 0 | 35 | Days |
| RO | 35 | 365 | 365 | 0 | 365 | Days |

| | 1month | 3month | 1year | |
|-----|--------|--------|-------|------|
| Ret | 35 | 90 | 365 | Days |

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Developing an ITSM design

Management classes – Archive

- Additional management classes and/or node names for "archive"

| | "Normal" backups | | "Long term" backups | | |
|----|------------------|------------|---------------------|------------|----------|
| | Unique | Consistent | Unique | Consistent | |
| VE | 1 | NL | | NL | Versions |
| VD | 0 | NL | | NL | Versions |
| RE | 0 | 14 | No change | 365 | Days |
| RO | 0 | 365 | | 365 | Days |

(Alternate nodename)

| | "Normal" archives | | "Long term" archives | |
|-----|-------------------|---------|----------------------|----------|
| RET | Archive | 35 Days | Archive | 365 Days |

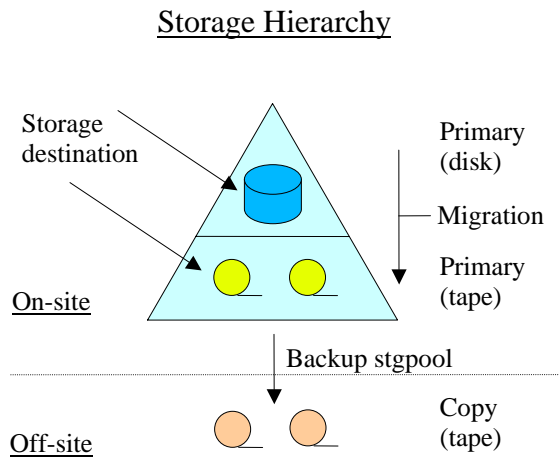
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Storage pool concepts

- Primary
 - Random access
 - Disk
 - Sequential media
 - Tape
 - File
 - Server
- Copy
 - Sequential media
 - Tape
 - File
 - Server



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Why have multiple Storage Pools?

- **Exploit physical characteristics of different media**
 - *Disk: Random access, caching, parallel client sessions, good small file performance*
 - *Tape: Sequential access, bulk storage, robust, removable, good streaming performance*
- **Control the location and grouping of data on physical media**
 - *Use collocation to trade backup/migration speed and tape efficiency for greatly improved bulk restore speed*
- **Vary the data communications path**
 - *LAN, SANergy, or LAN-free/Server-free backup*
- **Send different object types to different storage pools**
 - *Use DIRMC to send filesystem directory objects to a disk storage pool*
 - *Direct TDP Data, Logs, and Meta data into separate storage pools*
- **Produce multiple backups of certain object types**
 - *Eg. SAP archive logs*

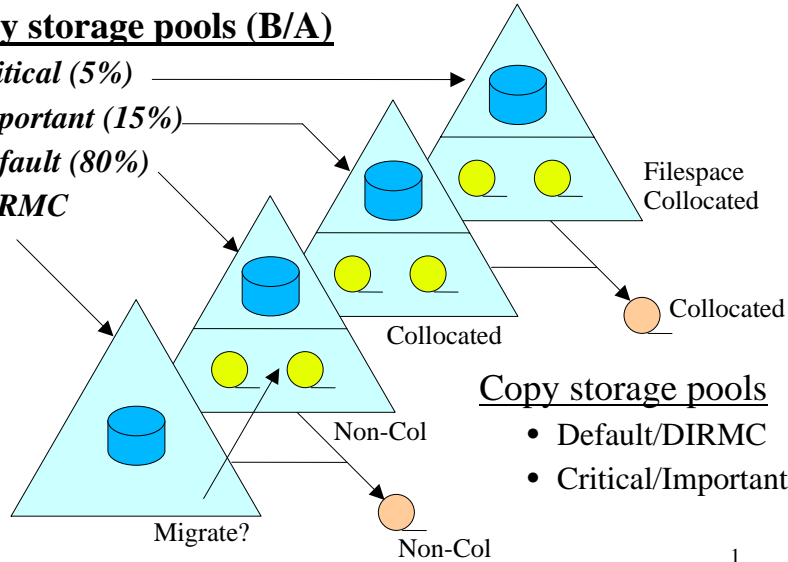
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Primary storage pools (B/A)

- *Critical (5%)*
- *Important (15%)*
- *Default (80%)*
- *DIRMC*



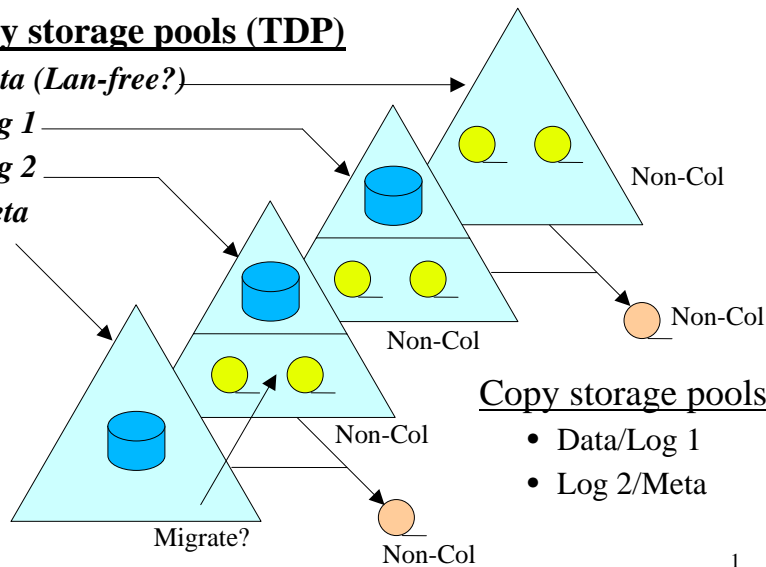
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Primary storage pools (TDP)

- *Data (Lan-free?)*
- *Log 1*
- *Log 2*
- *Meta*



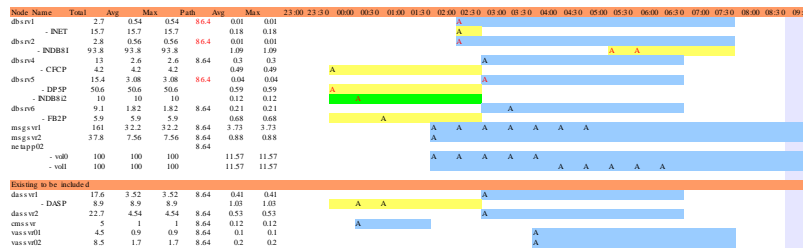
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Developing an ITSM design

Client schedules

- **Determine total amount of client backup data (per day)**
 - Consider full/incr database backups
- **Divide data size by the known network speed (LAN or SAN)**
 - How long will each client backup run
- Design a client schedule to suit
 - Obtain client backup windows from the business (consider non-TSM schedules)
 - Allow for limitations in network speed, maximum sessions, and tape contention
- Consider scheduling modes
 - Client polling / Server prompted mode



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Developing an ITSM design

Administrative schedules

- **DR tasks must be scheduled in the correct order**
 - First, complete client backups
 - Backup storage pools
 - Backup TSM database
 - Backup configuration files
 - Volume history file
 - Device configuration file
 - Run “prepare” if using DRM component
- **Optional scheduled tasks**
 - Inventory expiration
 - Force migration from disk to tape
 - Limit reclamation to a known timeframe

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Daily schedule

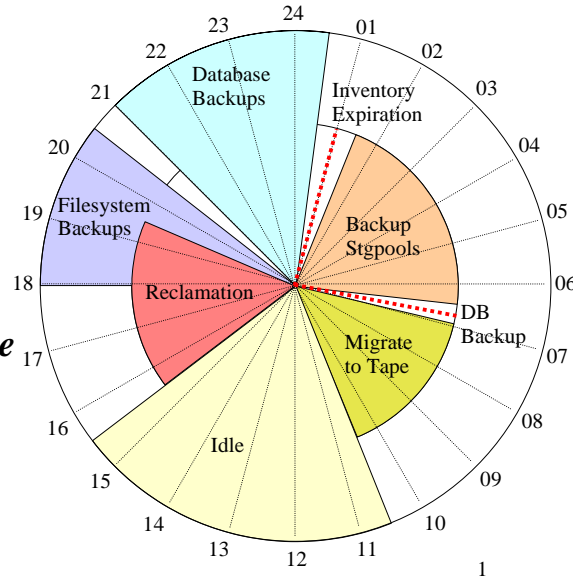
- *Combine client and admin schedules*
- *Allow idle time for ad-hoc usage*

Weekly schedule

- *Full DB backups*

Monthly/Yearly schedule

- *Backup sets*
- *Archives*

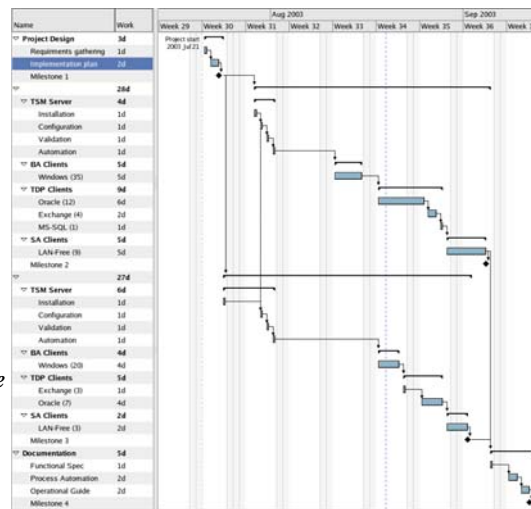


Planning and implementing ITSM **iBK** Implementation



Documentation

- **Project plan**
 - *Identify tasks*
 - *Configuration details*
 - *Mile stones*
- **Staged implementation**
 - *Development*
 - *Server/client configuration*
 - *Staff training*
 - *Acceptance testing*
 - *Ad-hoc restore performance*
 - *Disaster recovery testing*
 - *Isolated environment*
 - *Production*
 - *Replicate development*



Planning and implementing ITSM **iBK** Implementation



Change management process

- **Pre-requisite tasks**
 - OS patch levels, hardware configuration
- **Back-out preparation**
 - ITSM software removal, Application configuration changes
- **Co-requisite tasks**
 - Disable legacy backup system, Change application configuration
- **Perform task**
 - Install and configure the ITSM code
- **Post-requisite tasks**
 - Is a reboot required
- **Acceptance testing**
- **Back-out procedure**

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Planning and implementing ITSM **iBK** Implementation



Repeatable process

- **Document all installation steps**
 - Server and client
- **If available, use an installation service**
- **Standardized client configuration**
 - Installation directory
 - Environment variables
 - Configuration files
- **Use server-based client option sets**

dsm.sys

```

-----
Servername          Production
TCPServerAddress   tsmprd1.domain.com
TCPPort            1500

Nodename            myhost
passwordaccess     generate
compression        yes

domain              all-local
includexcl         /usr/local/etc/dsm.inx

errorlogname        /var/log/dsmerror.log
errorlogretention  7
schedlogname        /var/log/dsmsched.log
schedlogretention  7

-----
Servername          DisasterRecovery
TCPServerAddress   tsmdr1.domain.com
TCPPort            1600

Nodename            myhost
passwordaccess     generate
compression        yes

domain              all-local
includexcl         /usr/local/etc/dsm.inx

errorlogname        /var/log/dr.dsmerror.log
errorlogretention  7
schedlogname        /var/log/dr.dsmsched.log
schedlogretention  7
    
```

dsm.opt

```

TCPServerName      Production
Compressalways     No
    
```

dsm.inx

```

exclude            /.../core
exclude            /.../tmp/.../*
exclude            *.dbf

include            /home/.../* home_mc
    
```

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Validation

- **Is the include/exclude list parsed correctly**
 - *dsm*
 - *dsmc q inclexcl*
- **Are the backup/archive objects binding to the expected management classes**
 - *select class_name, hl_name, ll_name, count(*)
from backups
where node_name='BUNNY'
group by class_name*
- **Were your sizing estimates correct**
 - *Monitor client and administrative scheduled event durations*
 - *Review ITSM database and Recovery log size and utilization*
 - *Are the disk storage pools appropriately sized*

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Automation

- **Apache SSL**
 - *Secure web proxy*
 - *Operational reporting tool*
- **Perl CGI**
 - *Query the server*
 - *Label new tapes*
 - *Check tapes in/out*
 - *Move DR media*
 - *Manage backup sets*

| Tape | Date | Type | Stgpool | Slot | Move |
|--------|------------|-------------|---------------|------|------|
| ME0000 | 2003-09-04 | CopyStgPool | COPY_DR_TAPE | 43 | F |
| ME0007 | 2003-09-04 | CopyStgPool | COPY_BA_TAPE | 44 | F |
| ME0011 | 2003-09-04 | CopyStgPool | COPY_BA_TAPE | 48 | F |
| ME0012 | 2003-09-04 | CopyStgPool | COPY_TDF_TAPE | 49 | F |
| ME0013 | 2003-09-04 | DBSnapshot | | 50 | F |

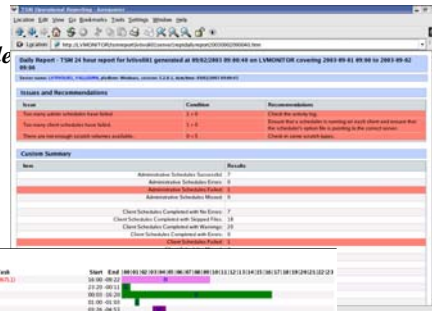
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Operational reporting and monitoring

- **Operational Reporting tool**
 - Configured via TSM management console
 - Installs as a service on Win2K+
 - Sends e-mail reports and/or creates web pages for later review
- **Write your own tool**
 - Use “dsmadm” to interrogate the TSM server database
 - Interesting data in
 - Activity log
 - Summary log
 - dsmacct.log
 - General SQL queries
- **SNMP monitoring**



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Planning and implementing ITSM **IBK** Implementation



What to do when things go wrong...

- **General problem resolution skills**
 - RTFLF
 - Server activity log
 - Client error log, schedule log, TDP log files
 - Operating system logs (AIX errpt, NT eventlog, etc)
 - Isolate and replicate the problem
 - Root cause analysis
 - Consider performing a Server or Client Trace
- **IBM/Tivoli support**
 - Customer number
 - Full problem description and hardware/software details
 - What Priority to set
- **ADSM-L mailing list**

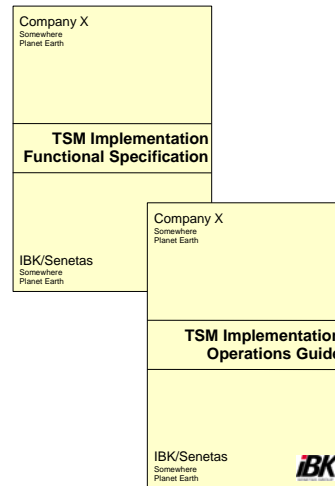
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Planning and implementing ITSM **iBK** Implementation



Documentation

- **Functional specification**
 - Installed software versions, patches, directories, log files, and media locations
 - Server configuration
 - Client configuration (B/A and TDP)
 - Administrative and client schedules
- **Operations guide**
 - Checking the status of the server
 - Checking the status of the client backups
 - Filesystem and TDP clients
 - Tape handling
 - Tape labeling, check-in, and check-out
 - Off-site DR tape movement
 - Problem determination



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Planning and implementing ITSM **iBK** Post-implementation



Daily operational tasks

- **Assign responsibility to one group or individual**
 - Also assign someone to check that the daily tasks are completed
- **Check the status of the ITSM server**
 - Review the activity log for errors and exceptions
 - Tape read/write errors, ITSM database capacity, number of scratch tapes
 - Did the storage pool backups complete successfully
 - Did the ITSM database backup complete successfully
- **Check the status of last night's client backup**
 - Review the activity log, and/or client schedule logs
 - Is the client performance consistent
- **Perform off-site DR tape movement**
 - Send today's copy pool and database backup tapes off-site
 - Return reclaimed (empty) copy pool and database backup tapes on-site

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Planning and implementing ITSM

Three months later...

- **Confirm system performs as designed**
 - Are the client and administrative schedules still appropriate
 - Is tape volume usage acceptable
- **Analyze system growth**
 - ITSM database size and recovery log utilization
 - Disk storage pool capacity
 - Network utilization
- **Audit storage pool utilization**
 - Off-site tape storage
 - Is the off-site copy pool up to date
 - Have any tapes been “lost” in transit
 - Tape usage efficiency
 - Possibly change reclamation thresholds or scheduling

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Planning and implementing ITSM

Twelve months later...

- **Software upgrades**
 - ITSM (or database maintenance)
 - Operating system (does the platform support all required features)
 - Applications (does the new version have TDP support)
- **Hardware purchases**
 - Disk subsystems
 - Library extension, additional tape drives
- **Requirements changes**
 - Service Level Agreement updates
 - Business mergers
 - Staff availability
 - Reporting requirements

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Planning and implementing ITSM **iBK** Summary



In this course we discussed:

- **Requirements gathering**
- Sizing an ITSM server
- Developing an ITSM design
- Implementation
- **Post-implementation**

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Planning and implementing ITSM **iBK** The End



Only the beginning...



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