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Migrating TDM Data into Teamcenter

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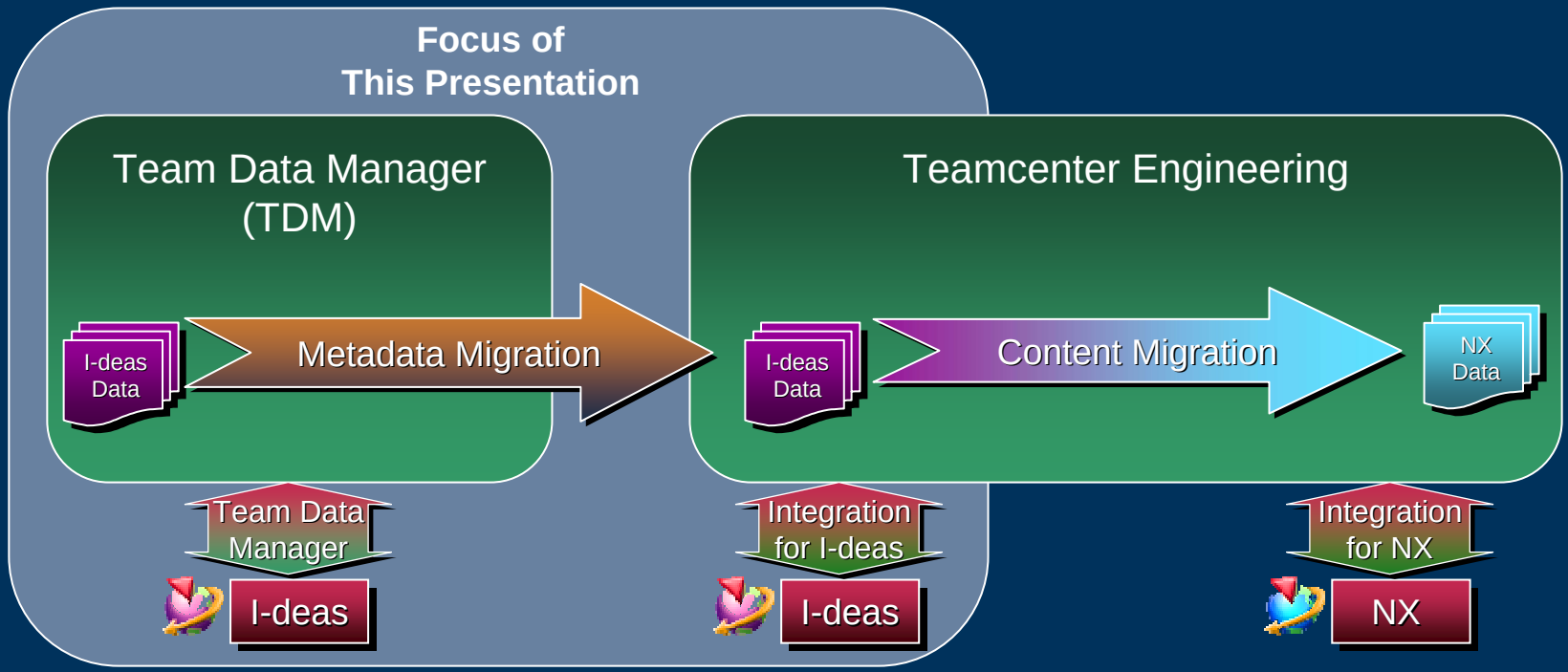
Objective and Outline

- Objective – Migration Tools and Options
  - Migration Tools and Techniques
  - Migration Strategies
  - Migration Options and Considerations
- Migration Performance
  - Present options with results as well as discuss performance strategies for the I-deas Multi-Site Collaboration Solution
  - Background and Default behaviors
  - Performance oriented options
- Examples to show a difference
  - Test results to project expected improvements
  - Details for deploying performance oriented concepts
- Recommendation

Background I-DEAS to NX

- Two Step I-deas to NX Data Migration Process
  - Step 1: Metadata Migration
  - Step 2: Content Migration



TDM – Teamcenter Migration

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- Migration Wizard
  - Portal tool to migrate from TDM to Teamcenter
  - Not recommended for large TDM migration
  - Migration Options
    - Entire TDM
    - Using MyMigrationTL.txt file (GUID control file)
- Command Line Migration Client
  - Recommended for production migration (> 5000 items)
  - Migration split into batches
  - Variable Structure Size during migration.

Migration – Strategies

- Big bang
  - Shutdown TDM, migrate, startup Teamcenter
- Pre-migrate / Re-migrate
  - Small incremental portion for final shutdown
- Latest version only
  - Migrate earlier versions at a later time if necessary
- Progressive Team deployment
- Data Sharing Import

Preparing for Data Migration

- Version to Revision mapping
- IDEAS_revision_id_format_specifier = %d
  - %d – sets Item Revision ID to TDM version number
  - options to supplement the version number as ID
    - %s – TDM revision
    - Example: given I-deas part – version 3; revision attribute B
      %d TcEng Rev. Name > 3
      %s_%03d TcEng Rev. Name > B_003
- IDEAS_revision_id_format_allow_truncate_ideas_rev
  - Default FALSE: item is skipped
- IDEAS_revision_id_format_blank_ideas_rev
  - %03d when using the %s option for IDEAS_revision_id_format_specifier

Preparing for Data Migration (Cont.)

- Create 2 Special Teamcenter Users
  - Migration User
  - Import/Export Lock User
    - IDEAS_external_owning_user_name
- Both should be members of all groups data will migrate into
- Neither should be in the dba group.
- Add ACL to restrict access to items owned by ielock user
- Plan ownership of TDM data in Teamcenter
  - TDM Migration Mapping Wizard

Attribute Mapping

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- Enable Attribute Mapping
  - Create class with fields for all I-deas Attributes
  - Create a form using this class
    - Parts / Assembly attribute form
  - Map attributes during migration
  - Create Query so users can locate items by TDM attributes
    - Project Name
    - Library Name
    - Created By
    - Modified By
    - Etc.

Structure Size and Batch Migration…

- Sort GUIDs on Number of Children in descending order.
  - If any assemblies have # Instances > 5 * # Children, move them up in the list.
  - Structure sizing is an art – not a science
    Ideal size related to # Children and # Instances
- Define profile, adjusting batch size and structure size according to the assembly sizes
  - Define batch size so process involves < 5000 items (Children)
    - Preferably < 2000 items per structure
    - Avoid swapping

Performing the Data Migration

- Users must check data into TDM Libraries
  - Model files are not migrated
- Use Migration Wizard for tests
  - Command line for production
  - Use GUID control file (MyMigrationTL.txt)
    dmadmin – MIG -> LD-Library Data report
    - Request both Assembly and Drawing Statistics
  - Structure Size
    - 1 is safest … slowest
    - Expanded Structure <2000 Item Versions
    - Expanded Batch <5000 Item Versions
- ***Backup the Database before every migration!***

Command Line Migration Usage
Teamcenter Integration for I-deas 5 and Newer

- Open a command window
- **`%IMAN_BIN%\run_ideas_migrate …`**
  - **`setup`**
  - **`validate <control_file_name>`**
  - **`migrate <control_file_name>`**
- Script will set I-deas and Teamcenter environment
- If you have multiple Teamcenter Databases, you might need to edit the script.

Best Advice Review

- Reinforcement
- Cleanup before migration
  - TDM cleanup tools exist
  - Cleanup this year even though migration is not planned until next year
- Have a validated plan
  - The migration tools can generate a bunch of mistakes quickly if you don’t have a plan
- Know where you are going before you start migration
  - Have a process - know and validate your end user processes, so that migration reflects that process

Migration Performance Background

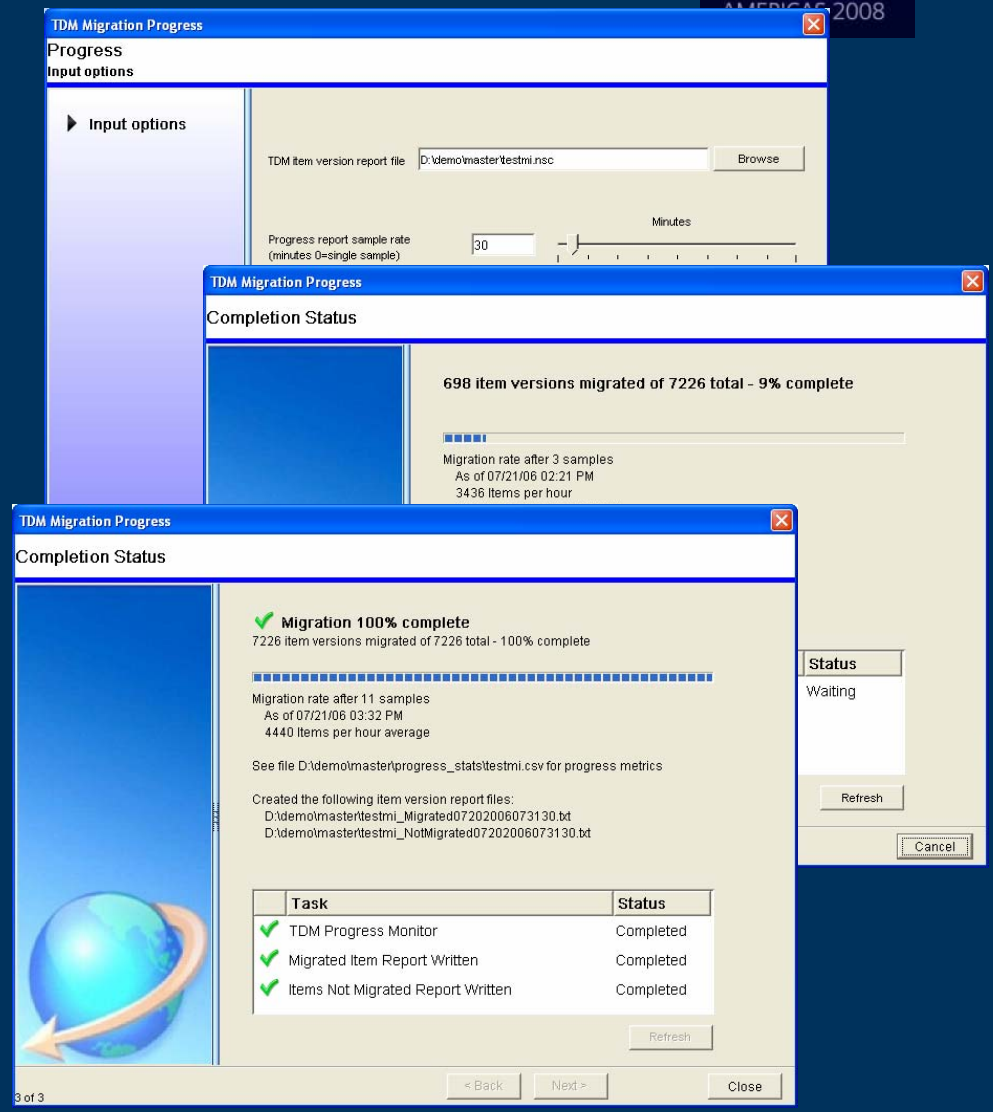
- Summary
- Migrate only the data required
  - First performance improvement is a plan that migrates only the data required to be in Teamcenter - A strategy could be…
    - Migrate data immediately required first
    - Deploy the end users
    - Migrate other data as background operation
      – or –
    - Migrate other data as needed / requested
- The Migration Command Line tool is the recommended tool for applying performance tuning options.
  - Divides migration process into batches
    - Each batch can be tuned for the data specific to that batch

Opportunities to Improve Performance

- How fast is it going?
  - Migration Progress Wizard
- Large assembly Structure processing improvements in Integration for I-deas 4.0 & later
- Migration Preparation Options
  - Oracle database setup
  - Adjusting the migration Structure size
  - Tuning the batch migration performance profile
- New migration options in command line tool
  - Threaded Migration
  - Separation of bulk-data file processing
  - I-deas Registry Multi-Site Collaboration starting in Integration for I-deas 4.2

TDM Migration Progress Wizard

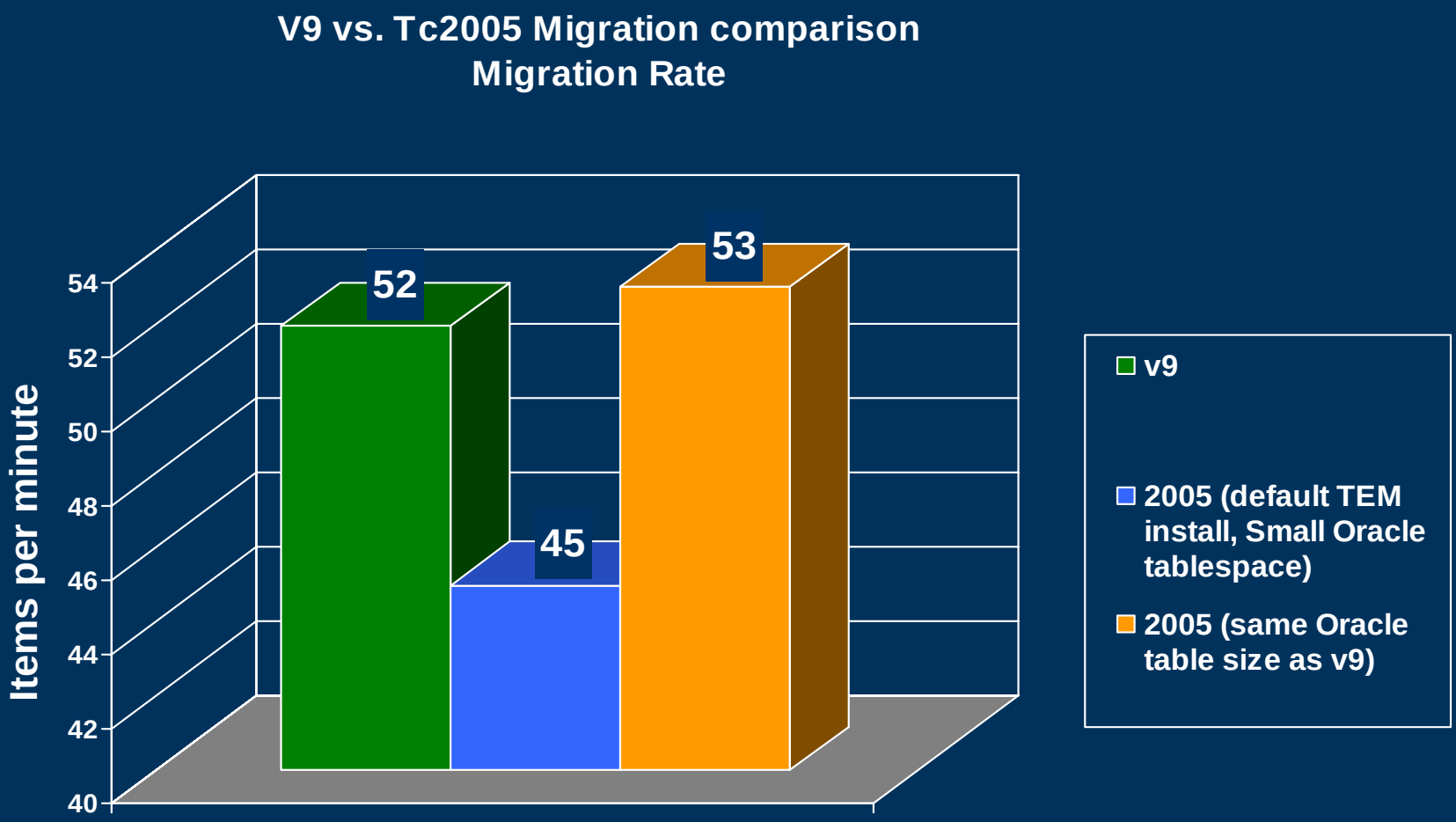
- Provide TDM Migration status, statistics and reports
  - Show graphically progress meter
  - Estimate time to completion
  - Provide “Migrated” and “Not migrated” tab delimited reports
    - Analysis of reports can be used for transition issue identification
- Wizard or Command line tool operation
  - Both take either miadmin or dmadmin reports as TDM baseline



Initial Oracle database and table space setup

- Initial Oracle database and table space setup
  - Don’t take defaults from TEM install
  - Estimate target database size based on 3-4 X TDM metadata file sizes
- Setting the Oracle database sizes to the expected size prior to migration facilitates the best performance
  - If the default TEM install Oracle table sizes are used then Migration is much slower due to the database being extended often during the migration
- Separate Oracle DB files across multiple disks.
- Set Oracle table space to auto-extend during migration (if necessary)

Initial Oracle database setup comparison



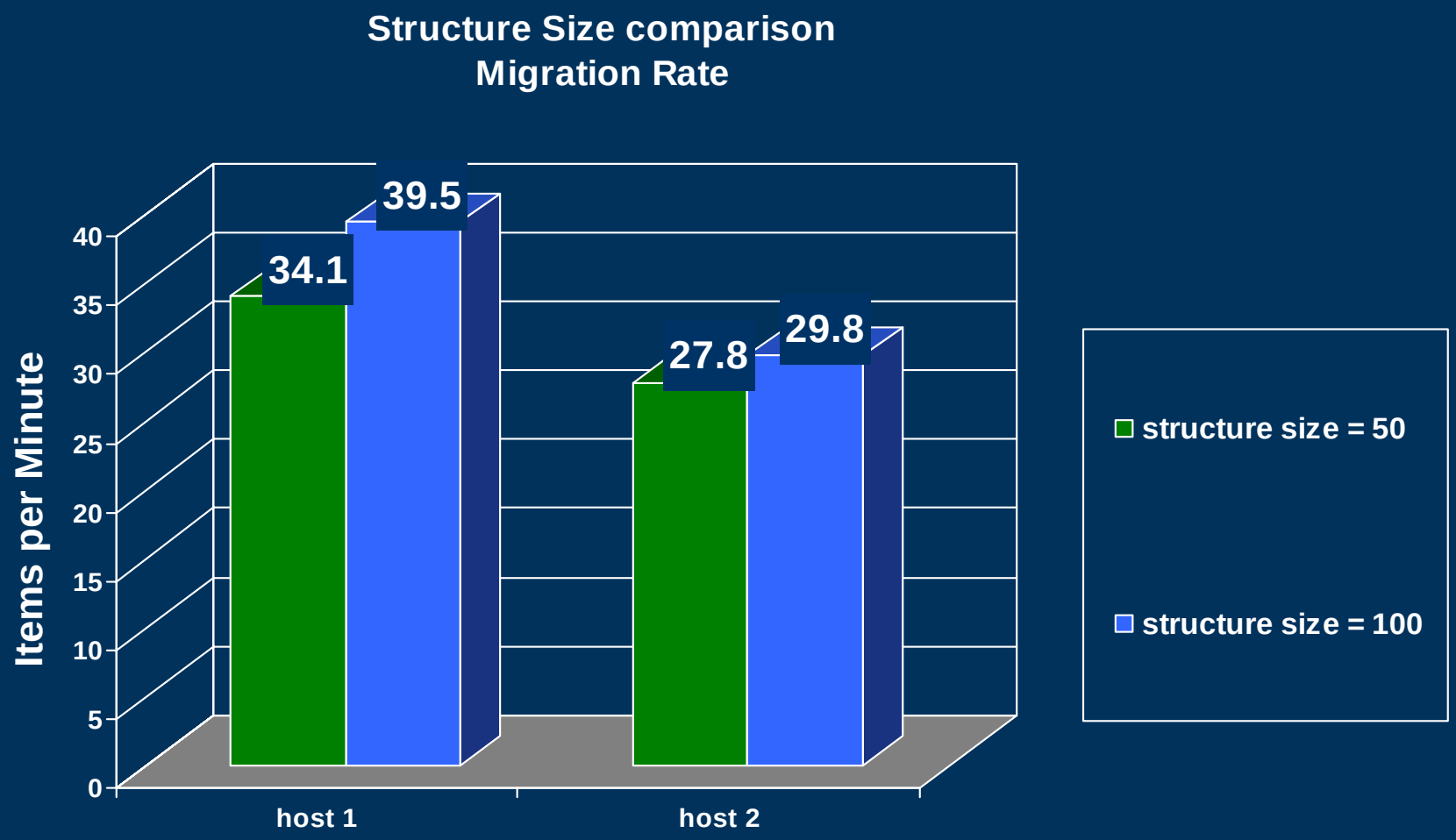
Initial Oracle database and table space setup

- Summary
  - 17% better migration rate if the Oracle database is setup to the expected size prior to migration
  - Tc Eng 2005 meets or exceeds the TDM migration performance of Tc Eng v9.1.2 (same Integration for I-deas code base)
    - 2% in development test

Migration Structure size impact on performance

- Default structure size is 10 – applies to all data types
- By separating the assembly items from the stand-alone parts and drawings, then the structures size can be adjusted to be appropriate for the data type
  - Build top level item migration file from dmadmin library data report option
  - Sort file on # of children statistic to group stand-alone parts & drawings together
- Structure size of 100 for stand-alone part/drawing migration results in up to 15% better throughput as compared to a size of 50

Structure size impact on performance



Tuning the Migration Batch Performance Profile

- Migration Command line tool has a profile option
  - The performance and efficiency of the migration is sensitive to the data profile
    - Tuning the batch size and structure size for specific data scenarios
  - Performance profile defines and tunes stages with batches of structures
    - @perfProfile=((NumberOfBatches,batchSize,structSize))
      - @perfProfile=((12, 5, 1), (4,1000, 30),('*', 2000, 200))
  - Performance goal is success
    - No failures due to lack of resources
    - Fewer items effected when a failure occurs
    - Migration continues with next structure when a failure occurs

Tuning the Migration Batch Performance Profile

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- **Primary guidelines**
  - Keep a structure to less than 2000 items in expanded list
  - Process no more than 4-5000 Item Revisions per batch – a Teamcenter session
  - Include several structures per batch (except for extremely large assembly cases)
  - Include several batches overall
  - Be aggressive on stand alone parts and drawings and part drawings

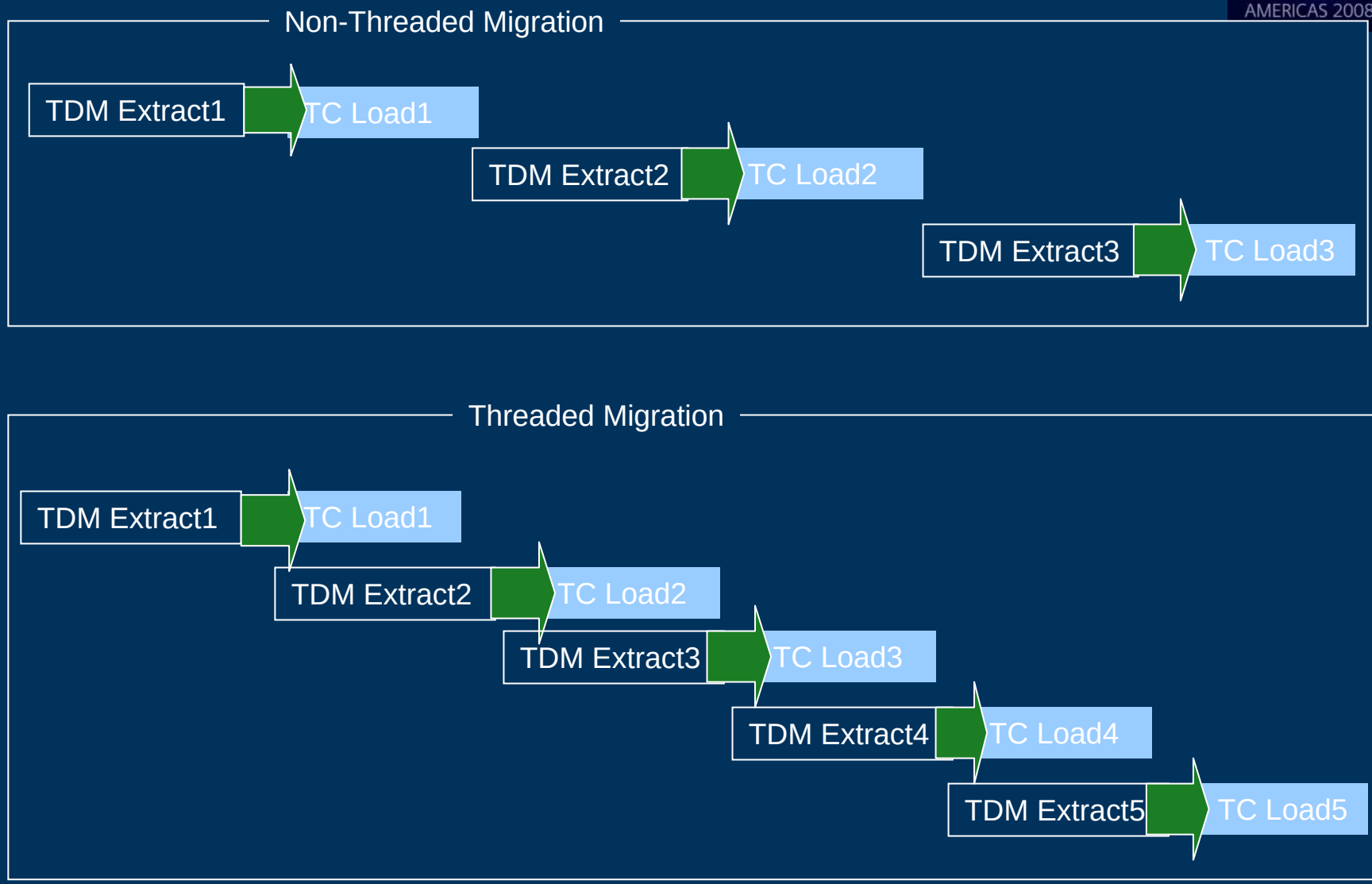
Tuning the Migration Batch Performance Profile

- **Summary**
  - Memory conservation
    - Avoid reaching swap limits – migration will crawl at that point
  - Transaction Risk management
    - Data issues, Memory issues, Oracle issues, “Murphy’s Law” - can cause items to fail – minimize the number of items impacted
  - Continuous migration through-put
    - Migration continues with next batch even after fatal error

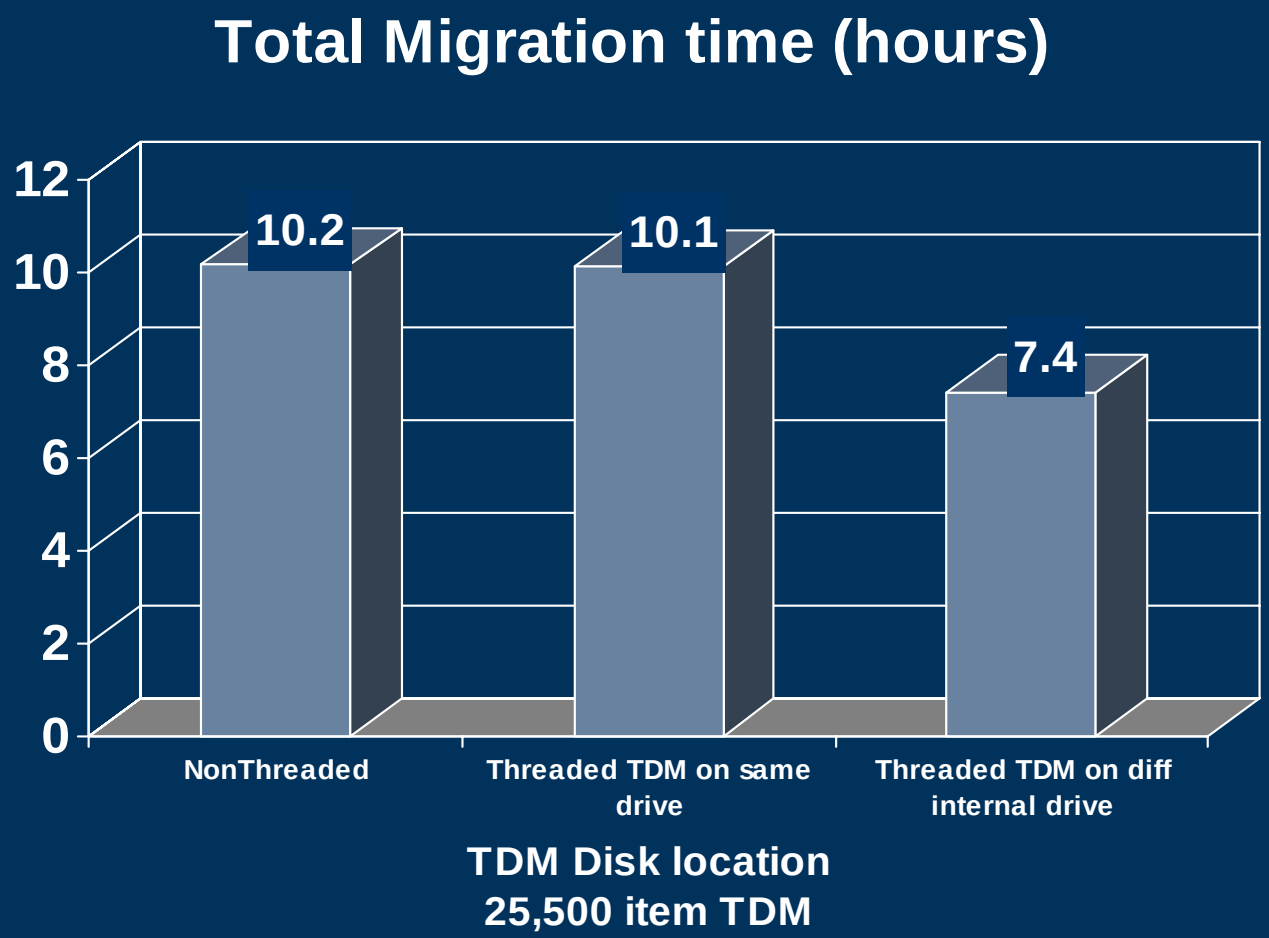
Multi-Threaded Migration

- New option in Teamcenter Integration for I-deas
  - Multi-Threaded Migration is enabled by setting the preference
    - **IDEAS_threaded_migration** = **TRUE**
    - **Default is TRUE**
  - In this mode, the migration process starts extracting the next structure from the TDM while the data from the current structure is being loaded into the Teamcenter Engineering database

Threaded Migration - Methodology



Multi-Threaded Migration



Multi-Threaded Migration

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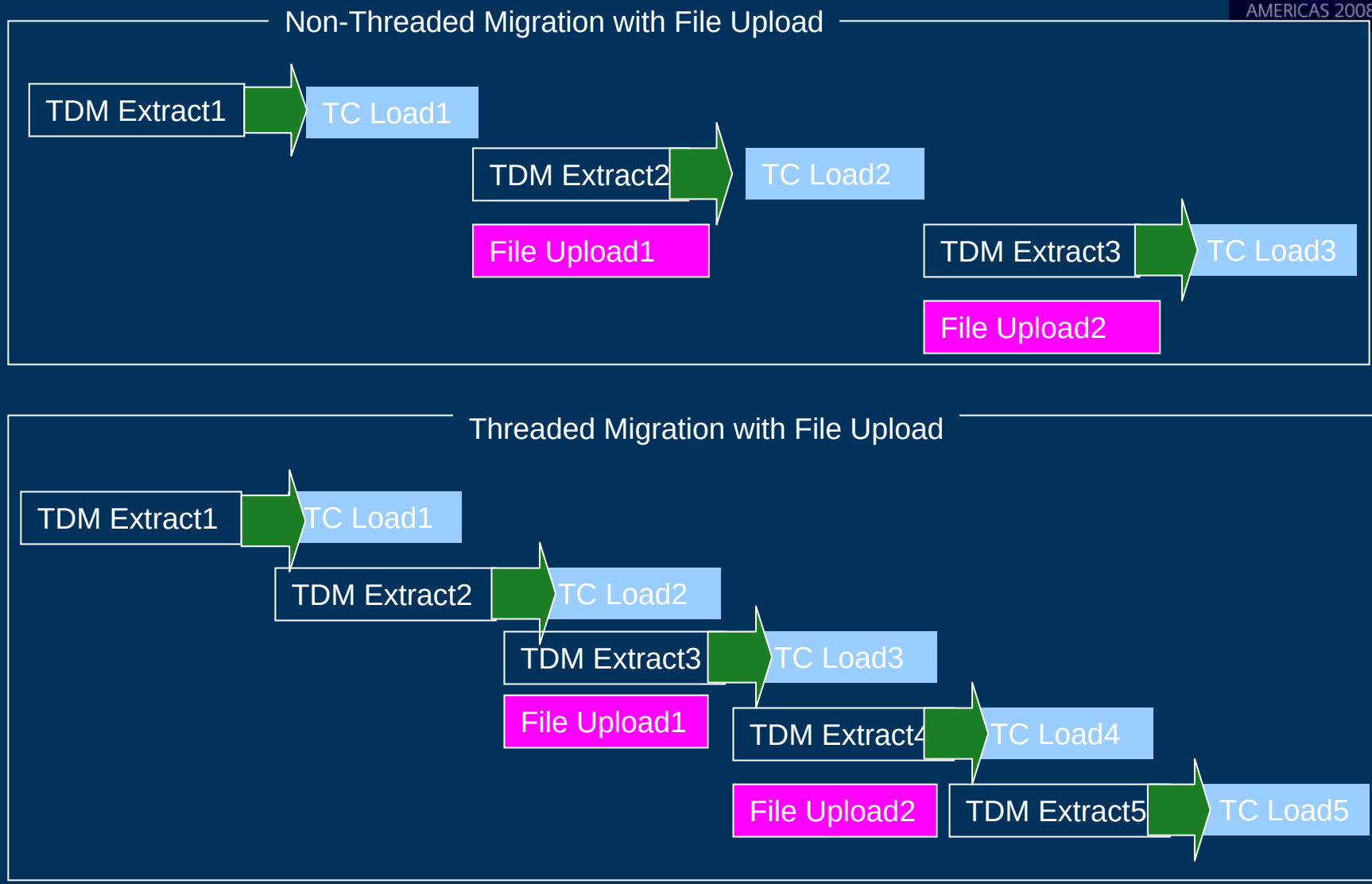
- Summary
- To realize Multi-Threaded migration performance gain, it is recommended that TDM be located on a different drive than that of TC/Oracle
  - So they do not compete for the same i/o resources
  - ~ 25% improvement - 2.5 hrs(150 mins) faster for migrating TDM of 25,500 item versions when they are located on different local internal drives

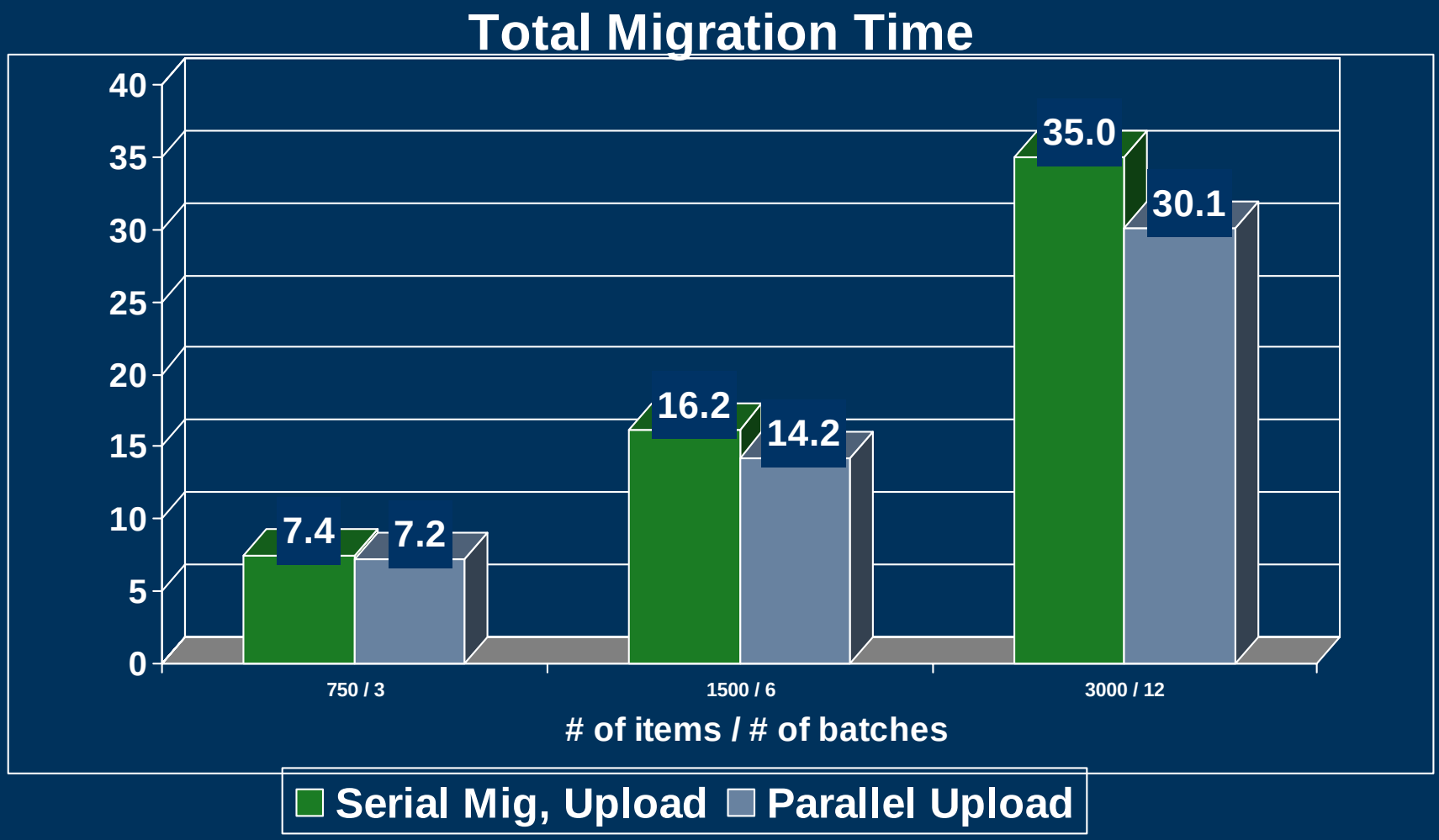
Post Processing of Library Data Files

- Parallel File Uploading
- To activate this feature, set the preference
  - **IDEAS_skip_ADBFiles_Transfer** to **TRUE**
  - To have the migration process skip the file transfer operation for library data files
    - post process the CAD files using the **ideas_upload_files** utility
    - Another benefit of the post process is to setup different default volume properties for the post process

Post Processing of Library Data Files



Post Processing of Library Data Files



Post Processing of Library Data Files

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- Summary
- Better performance as compared to sequential processing in all the cases
- 4 to 18 % improvement in various tests
- Larger batch size is yielding in increased gains from parallel file uploading

Multi-Site Collaboration and I-deas Migration

- How does it work?
- I-deas multi-site migration and data sharing assures the following for I-deas items shared or replicated across multiple sites
  - The same internal IDs are used at all sites for the same I-deas data so that synchronizing and site ownership is maintained
  - The same Item ID is used for each I-deas migration item migrated into multiple sites.
- It requires the setup of the I-deas Registry
  - The registry tracks the I-deas Item GUID per Item ID per owning site
  - The I-deas Registry is an extension to the standard Teamcenter ODS
  - Item ID publishing is not required for the I-deas Registry

Multi-Site Collaboration and I-deas Migration

- How does it work?
- Examples
  - If a shared version of item X is migrated to site 2, after it had been previously migrated to site 1, site 2 will use a replica from site1 automatically
  - If a newer version of item Y is migrated to site 2, after a reference version of item Y was previously migrated to site 1, then ownership of item Y will be automatically transfer to site 2 and the new version inserted
  - If a shared version of item Z is migrated to site 2, after it had been previously migrated to site 1 under a renamed Item ID X, site 2 will use a replica of item X from site1 automatically

Multi-Site Collaboration and I-deas Migration

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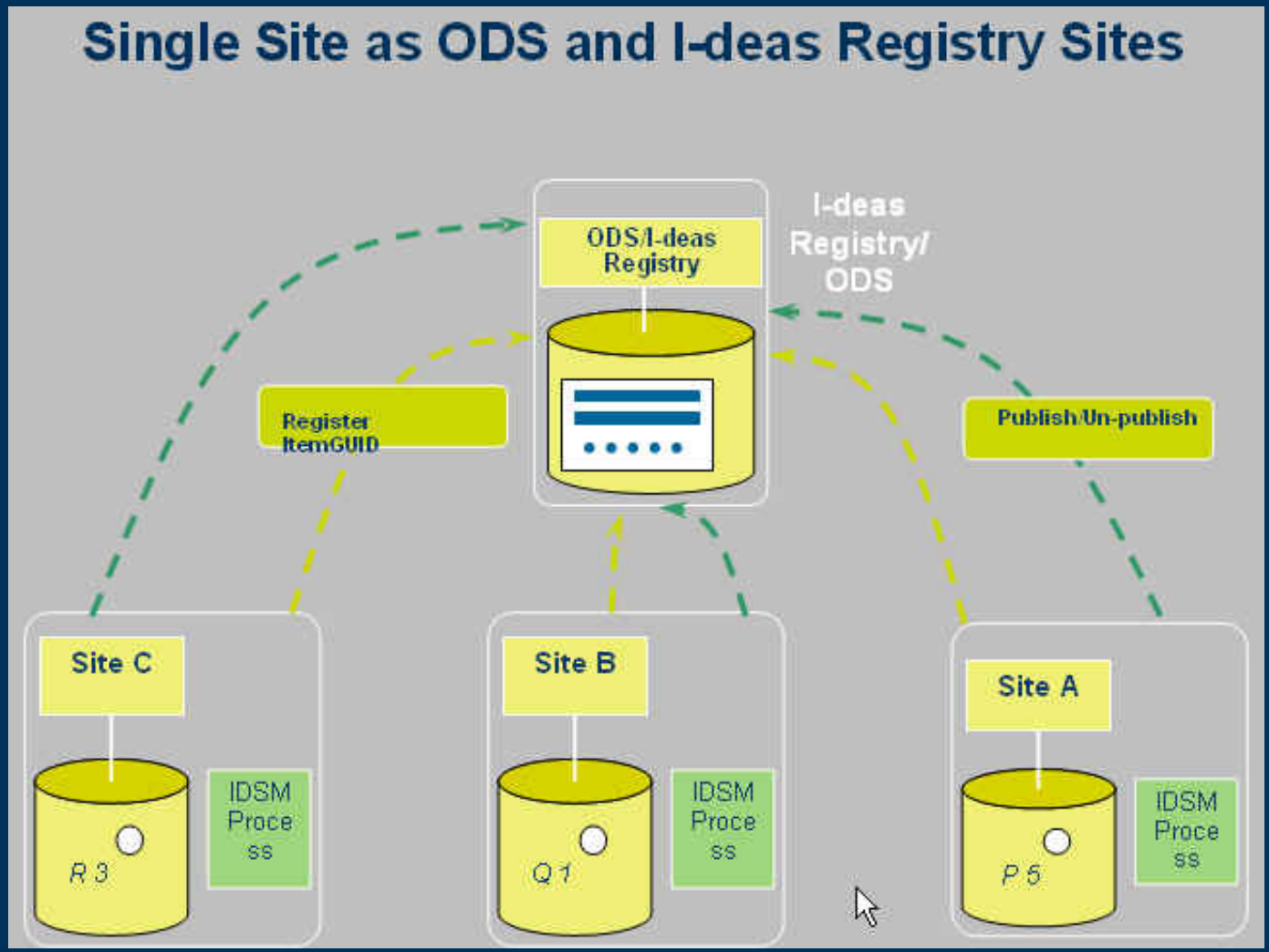
- I-deas Registry



Multi-Site Collaboration and I-deas Migration

- What are your options?
- The production configuration will be multiple geographically dispersed Teamcenter sites connected in a WAN
- Master site approach (small remote sites)
  - Migrate all TDMs into a single site, use data_share to push required to remote sites
- Headquarters migration strategy (Heavy TDM data sharing)
  - Pre-configure all sites in a LAN at headquarters
  - FTP all TDMs to HQ and migrate using LAN env.
  - Re-deploy each site to remote location pre-loaded
- Default (minimal data sharing among sites)
  - Migrate TDMs into final WAN configuration

Multi-Site Collaboration and I-deas Migration

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- Summary
- Plan and coordinate a central LAN setup of all site servers for the majority of the bulk I-deas data migration
  - Minimize cost of bulk file transfer among sites

Summary

- Teamcenter Integration for I-deas provides migration performance improvement opportunities
  - Migration progress monitoring and reports
  - Large assembly product structure scenario – up to 5X
  - Multi-threaded migration process – 25%
  - Post processing of the CAD file transfer – 18%
  - Migration structure size for stand-alone parts & drawings – 15%
  - Initial Oracle database size setup – 17%
  - Migration batch profiling –maximize efficiency, minimize risk
  - Multi-site Collaboration solution – new “hub-less” solution

Recommendations

- Migrate with latest Teamcenter Integration for I-deas to access OOTB improvements
  - Largest gain in the very large assembly case
  - Utilize multi-threaded migration option and locate TDM data on a separate local disk drive
  - Use Migration Progress Wizard to monitor and report on Migration progress
- Utilize larger structure sizes and profiles where appropriate
  - For stand-alone part & drawing migration increase structure size to 100 top level items per structure
  - Define a Migration profile for assembly migration when data includes very large assemblies
    - Performance is measured by success and staying within hardware memory constraints to maintain migration progress

Recommendations

- Post processing file uploads provides more options and some migration performance improvement
  - Requires planning, allows simultaneous processes
  - Supports multiple volume server distribution of large CAD files by group ownership
- Deploy the new I-deas Registry solution for Multi-site Collaboration when I-deas Migration and Data Sharing is required
  - If possible, pre-configure all sites in LAN environment and migrate bulk of TDM data into a LAN located setup
  - Finally deploy site server to remote location pre-loaded with migrated data

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Thank You!
Questions?

Presentation Appendix

- Background detail
- Tuning Migration Batch Profile detail

Background

- Portal Migration Wizard
  - Good for learning the migration process and executing small tests
  - Not capable of handling the memory requirements of a complete TDM migration in one process
- Command Line migration tool
  - Recommended tool for production migration
  - Divides migration process into batches
  - Each batch can be tuned for the data specific to that batch

Background - Command Line migration tool

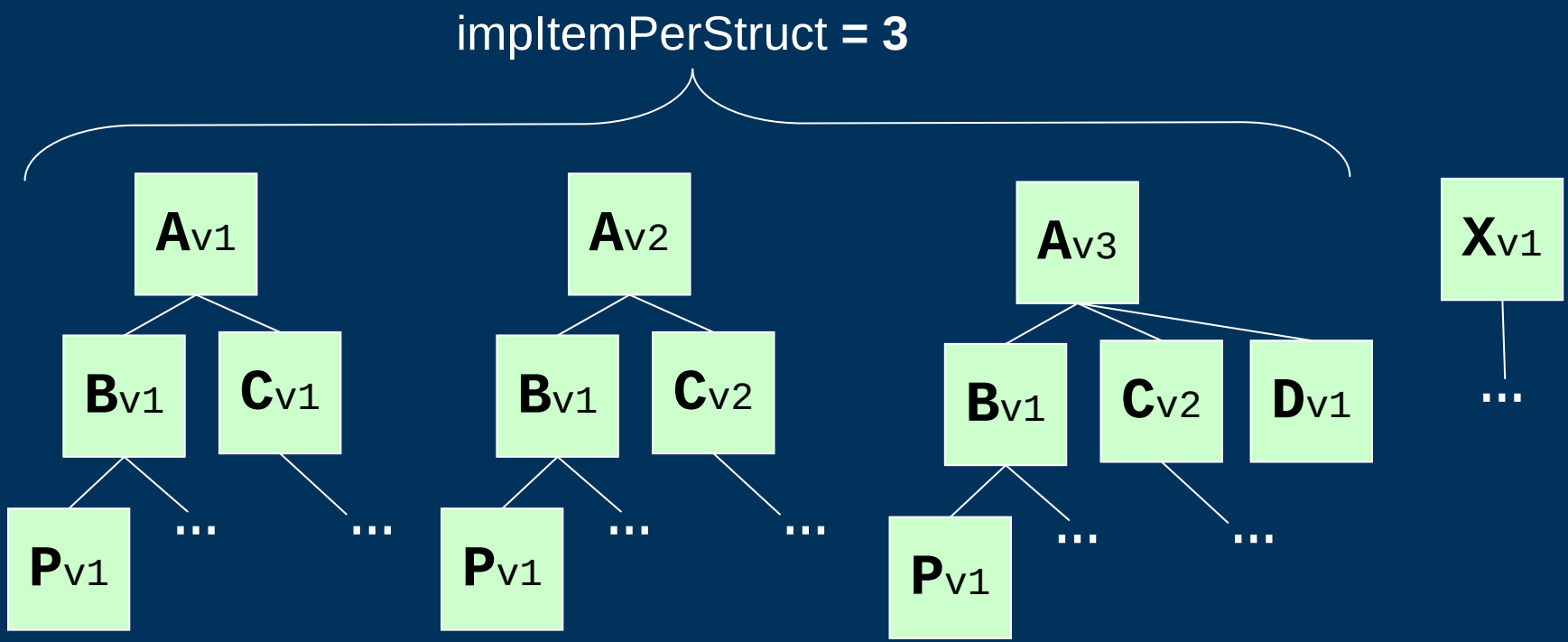
- Using run_ideas_migrate
- Setup
  - Generates a control file
  - Generates a Top Level item file
- Validate
  - Validates the customized control file and the GUID file contents
- Migrate
  - Initiates the migration process

Background

- The basic Migration process is ..
  - Extract the data from TDM
  - Transform the data to the Teamcenter data model
  - Load Ideas data into Teamcenter Items, Item Revisions, datasets
- The basic Unit of Migration is the “Structure”
  - A group of top level I-deas items. A top level Item is …
    - All I-deas Drawing, FEM and Drawing Set items
    - Any independent assembly item not included in a drawing
    - Any part item not used in any drawing or assembly
- TDM Migration is extracting, transforming and loading each “Structure” until all data is migrated

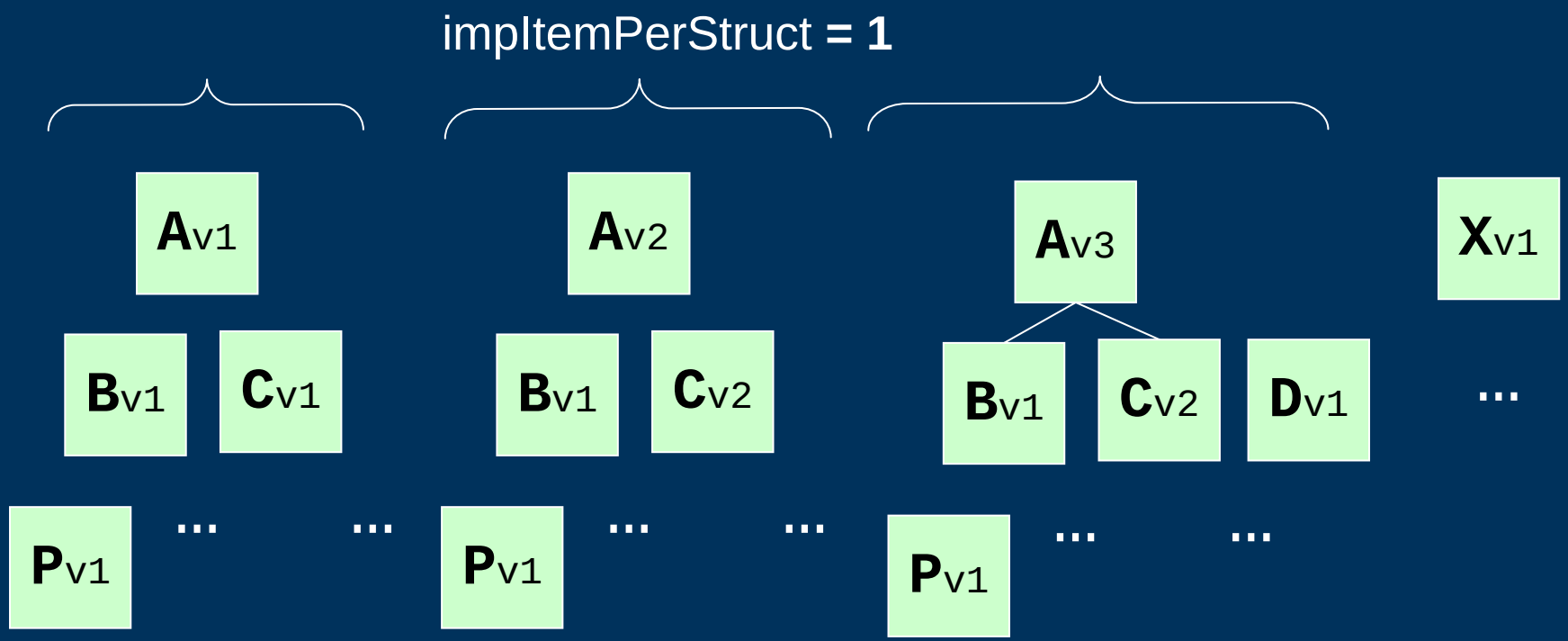
Background - Structure Size

- Better Structure size, process versions of top level together
- Child versions Bv1 and Pv1 only processed once



Background - Structure Size

- Worse Structure size, redundant item processing
- Child item versions, Bv1and Pv1 are processed 3 times



Tuning the Migration Batch Profile

- The “art” of the migration profile
  - Why worry
  - Primary guidelines
  - What is the migration profile
  - Creating a TL GUID file for Migration
  - When to use TL file sorted by assembly size
  - Translating sorted assembly size into migration profile
- Note:
  - This is an art
  - These suggestions do come from observed experiences
  - The answer is customer data / environment dependent
  - The approach should be validated and adjusted based on local testing

Tuning the Migration Batch Profile

- **Why worry**
- The performance of the migration is sensitive to the data profile
- Memory conservation
  - Manage memory required for one transaction
    - Such as Orbix message size required
    - For a moment in the process, 3X data objects are in memory
      - each server copy + orbix pipeline memory
  - Avoid reaching swap limits – migration will crawl at that point
  - Tc 2005 (v10) memory mgmt much better than v9
  - NXMI 4.0 pclsvr much better for large assemblies
  - Imanserver wants to keep memory of objects for quick reference
    - Not required from structure to structure in migration tool - no choice
- Transaction Risk management
  - Longer batches, structures put more items to be migrated at risk due to failure
  - Data issues can cause structure failures, minimize the number of items that must be re-migrated
  - Memory issues, Oracle issues, can cause batches to fail – minimize the number of items impacted
  - More batch breakpoints provide migration abort options.

Tuning the Migration Batch Profile

- **Primary guidelines**
  - Keep a structure to less than 2000 items in expanded list
    - This affects the pclsvr process
    - Target pclsvr process time of less than 20 minutes
  - Process no more than 4-5000 Item Revisions per batch – a Teamcenter session
    - This affects the imanserver process
    - Sum of items (matched or new) from all structures in a batch
    - Adjust this target down when most items are all new- eg. 2-4000 new items
  - Include several structures per batch (except for extremely large assembly cases)
    - So that threaded migration option has benefit
      - threaded benefit doesn't start until second structure of a batch
  - Include several batches overall
    - Minimizes number of items impacted by a batch failure
    - Permits parallel processing of CAD file upload option also
  - Be aggressive on stand alone parts and drawings and part drawings
    - Structure size of 80-100 for stand-alone items
    - Structure size of 40-50 for part drawings and FEMs, and small assemblies with 2-3 children

Tuning the Migration Batch Profile

- **What is the migration batch profile**
  - Parameters that define the size of migration processes (pclsvr & Teamcenter)
    - Default Constant batch and structure size, no data knowledge
      - $impItemsPerStrc=40;
      - $batchSize=100;
    - Performance profile, data specific orientation
      - Varying batch and structure size
  - Performance profile defines - stages with batches of structures
    - @perfProfile=((NumberOfBatches,batchSize,structSize))
      - Each tuple is a stage comprised of some number of batches all with a common structure size
      - @perfProfile=((12, 5, 1), (4,1000, 30),('*', 2000, 200))
        - Stage 1 is 12 batches of batch size 5, each batch processing 1 top level item per structure for a total of 12*5=60 top level items

Tuning the Migration Batch Profile

- **Creating a TL GUID file for Migration**
  - 2 methods
    - Ideas_migrate –setup
    - Dmadmin mig;ld report
  - Use Ideas_migrate –setup when no large assemblies
    - TDM query logging will suggest a migration profile

      Processed: Item series=74463, Item versions=102876

      Query returns 27287 item GUIDs

      Query returns ASSEMBLIES: 8924: asm=6855, drwA=293, mdfA=1776

      ASM profile: (39, 228, 10)

      ASM profile: (1, 32, 10)

      Query returns SINGLES: 11891: prt=7454, dwg=4328, asmS=109

      PRT profile: (11, 1081, 40)

      Query returns DRAWINGS: 6472: drwP=547, mdfP=5862, fem=63

      DRW profile: (12, 539, 20)

      DRW profile: (1, 4, 20)
  - Use Profile ((39, 228, 10), (1, 32, 10), (6, 1920, 80),(1,371,80), (6,1000,40), (1, 472, 40));

Tuning the Migration Batch Profile

- **Creating a TL GUID file for Migration**
  - Only first two fields of TL file are used by migration tool
    - Version GUID and project ID
    - Remainder of fields can be anything
  - Else use dmadmin report
    - Request top level only
    - Latest version only – depends on migration strategy
    - Request assembly statistics
      - Drawing details information is for drawing mgmt, not required for this.
  - dmadmin produces delimited file
    - “|” (pipe char) is default delimiter
    - 11m4 dmadmin can be set to output tab delimited
      - param file: datamgmt.get_report_delimiter: t (for tab)
    - NXMI 4.0 pclsvr will read either tab or pipe delimited TL GUID file

Tuning the Migration Batch Profile

- **When to use TL file sorted by assembly size**
  - If TDM has more than a few of…
    - assemblies with greater than 300 children
    - assemblies with greater than 8000 instances
    - And most assemblies are medium to large
  - If the migration structure pclsvr logging shows…
    - Total instances per structure greater than 20,000
      - Eg. Item Versions=1340, Total Relations=1307, Total Instances=23326
    - Total items per structure approaching 2000
  - Customer knowledge includes
    - Very Large to Huge assemblies, 50,000+ instances, or 1000+ children
      - Eg. PFSC 80,000 instances, TSA 200,000 instances, Nissan 250,000 instances

Tuning the Migration Batch Profile

- **Translating sorted assembly size into migration profile**
  - Sort TL GUID file by assembly children count descending order
    - Observe both maximum instance count and maximum child count
    - If instance count has extreme value may need to manually move to top of list
  - Record range of data observations in table to include structure and batch size guess
    - Note: latest only versus all versions strategy/requirements
      - Take average of child count in range to determine batch size
      - Factor by re-use/overlap among asm
      - Divide target batch total count by average to get batch size
      - Round off
    - Define Struct size based on max child count in range
    - Define stage for small assembly row count
    - Define stage for stand alone row count

Tuning the migration batch profile

- **Translating sorted TL GUID file (by assembly size) into migration profile**
  - Example
    - Profile observations
    - Max 4502 instances (616 children)
    - Max 754 children (2878 inst)

Child count >=	~row # all TL versions	~row # latest TL only	Struct size	Batch size
500	100	50	2	10
400	250	120	2	20
200	500	220	4	40
100	1000	500	4	40
50	2000	1050	8	80
20	4200	2300	8	120
10	6200	3600	8	120
2	13300	7150	20	500
1	13300-25000	7150-14700	50	1000
0	25000-35204	14700-19791	100	2000

  - Suggested profile, latest versions only
    - (5,10,2),(3,20,2),(3,40,4),(5,50,5),(7,80,8),(25,120,8),(7,500,20),(8,1000,50),(*,2000,100)

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