Database migration as part of SUM:
DMO overview and tuning

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Agenda Database Migration Option (DMO) with SUM

What is DMO?
- What use cases? Which kind of systems?

How does it work?
- Procedure details

How to tune and optimize downtime?
- Aspects for technical downtime of DMO procedure
DMO in a nutshell

Database Migration Option (DMO):

- **SUM use case** for AS ABAP based systems, using SUM 1.0 (target < 7.50) or SUM 2.0 (target ≥ 7.50)
- **Database Migration**: migrate a system to a different database type (heterogenous migration)
- **In-place procedure**: database (host) is switched, but Primary Application Server (PAS) host is kept
- **Initially only** target database type SAP HANA, now additional targets possible (see SAP note on DMO)
- **System Conversion** from SAP ERP to SAP S/4HANA uses DMO (if source database not yet SAP HANA)

DMO is alternative approach to classical migration (heterogenous system copy)

- System update, Unicode Conversion* and database migration combined in one tool, one downtime
- Migration steps are simplified: consultant certification not required
- Business Downtime is reduced

* Only for target systems below BASIS 7.50
Comparison of migration options – example: SAP HANA database

- **SAP ECC 6.0 EHP7**
  - AS ABAP 7.4 Kernel 7.4x
  - Unicode Migration
  - Update/Upgrade [SUM]

- **SAP ECC 6.0 EHPx**
  - AS ABAP 7.0x Kernel 7.x

- **Source DB**

- **DMO of SUM**
  - Unicode conversion + upgrade + DB migration

- **SAP ECC 6.0 EHP7**
  - AS ABAP 7.4 Kernel 7.x

* Only for target systems below BASIS 7.50
DMO: Business Case
Upgrade and migration in a combined procedure reduces TCO and risks

Combined procedure needs only one maintenance phase (not two)
➢ Reduces business downtime (TCO), less regression tests necessary

In-place migration keeps application server and System-ID stable
➢ Low impact on system landscape: only database server is new

Original database is kept, can be reactivated as fallback
➢ Reduces risk, no restore required, more time for testing before cutover

No necessity for big export file share during migration
➢ Direct migration transfer without large dump files
DMO phases during the procedure

1. Upgrade “Prepare”
2. Execute Upgrade (until downtime phase)
3. Enter downtime
4. Migrate application data
5. Finalize Upgrade
6. Start SAP HANA-based system

Note
Source database continues to run, but is no longer used to store data -> easy reset possible

Setup SAP HANA specifics (client, schema ...)

Time
Uptime
Downtime

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DMO use cases (1/2)

- **DMO** is the combination of update and migration, potentially with Unicode Conversion (target < 7.50)

- **SUM runs on PAS** host ("in-place"), SUM starts R3load on that host

- **Running SUM on AAS** (Additional AS) host is possible (restrictions apply, see SAP note on DMO) Benefit: run SUM on host with best resources

- **„DMO without System Update“**: use case to migrate only, no update of SAP software (only for target database type SAP HANA)
DMO use cases (2/2)

- DMO not supported for data center migration due to latency issues (source & target database in separate data center)

- “DMO with System Move”: use case to move complete SAP system
  - Allows to switch PAS host
  - Allows to migrate across data centers

- Requirements:
  - Target database and target PAS are set up prior to start
  - Target database type is SAP HANA or SAP ASE

- Sequence:
  - Start SUM in source, export happens
  - Copy and start SUM on target, import happens

- Can be combined with “DMO without Software Update” and with “SUM on AAS”
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DMO: SUM Start

SUM is started

PAS Host

Source Host

PRD Instance

SUM

Source Kernel

Source DB Host

PRD REP

Application Data

Target DB Host
**DMO: Shadow system created**

**Note:**
For a system conversion to SAP S/4HANA 1909, the approach is different, as the shadow repository is then been created on the target database, see blog link below.


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**Uptime:**
Shadow system is created
DMO: shadow repository migrated

Uptime: Shadow repository is migrated
DMO: application tables are migrated

Downtime: Application tables are migrated
DMO: update part

Downtime:
Target kernel is used

Source DB Host

<table>
<thead>
<tr>
<th>Application Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRD REP</td>
</tr>
<tr>
<td>SHD REP</td>
</tr>
</tbody>
</table>

Target DB Host

<table>
<thead>
<tr>
<th>Application Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGT REP</td>
</tr>
</tbody>
</table>

PAS Host

<table>
<thead>
<tr>
<th>PAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGT Kernel</td>
</tr>
</tbody>
</table>

Target kernel is used
DMO: procedure finished

Downtime:
Application tables are updated
Procedure finished
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Tune and optimize downtime

- **Downtime** is dominated by migration part

- **Migration** is influenced by
  - Number of R3loads configured for downtime
  - Network bandwidth: use 10 Gbit/s network card, use no firewall

- Rule of thumb: migration rate of ~ 300 GB/hours should be possible in standard set up with an estimated additional ~8 hours for the update part, technical downtime can be estimated

⇒ **Task is to optimize number of R3load processes**

- Table split calculated by SUM automatically, based on table size
  - Keep source database statistic up to date

⇒ **Optimize table split calculation** by providing table *duration files* from previous run
Downtime optimization: overview

- **Use Benchmarking** before the DMO run: quick test
  Benchmarking focuses on migration (no shadow system)

- **Adjust number of R3load processes**
  during Benchmarking, and during DMO procedure

- **Use the Test Cycle Option**
  this allows a fast repetition of only the downtime migration for a test run, no need to start from scratch

- **Provide the migration duration** file from previous run:
  it lists measured table migration duration, SUM will use this for optimized table split

- **Consider downtime optimized techniques:**
  - Downtime-optimized DMO: moves migration partly to uptime
    (for SAP Business Suite systems)
  - Delta queue cloning (for SAP BW systems)
  - NZDT Service approach (SAP Note 693168)
Recommended Procedure

➢ **Start with the Benchmarking** tool
  ➢ *Export only* mode with 100 % of all tables: log file shows total database size to be migrated
  ➢ *Export only* mode with 10 % of all tables: shows potential bottleneck in source database
  ➢ *Export & Import* mode with 10 % of all tables: first impression on migration rate
  ➢ Vary number of R3loads to find optimum, use migration repetition option (test cycle) for fast repeat

➢ **Continue with DMO**, reuse duration file from benchmarking run, use migration repetition option
  ➢ Vary number of R3loads to find optimum, use migration repetition option (test cycle) for fast repeat
  ➢ Then keep optimum number of R3load processes fixed during complete procedure

➢ See following information source on this:
Uptime Migration (downtime-optimized DMO)
Generally available with SUM 2.0 SP 06 for system conversions and migrations

- **Uptime migration** for selected large application tables
  - User changes are reflected with record-and-replay technology of SUM
  - Includes initial and delta migration in uptime, remaining delta migration in downtime

- Option is offered on SUM dialog on scenario strategy
- Report available to select appropriate tables for uptime migration
- Replication monitoring is part of SUM Utilities
- Applicable only if source is not yet on SAP HANA database

[Diagram of SUM Uptime Processing, Technical SUM Downtime, Post Activities, Business Validation, Ramp Up and Ramp Down]

Further Information for DMO of SUM

Central Release Note
Software Logistics Toolset 1.0 – 1563579
http://service.sap.com/sap/support/notes/1563579

DMO with SUM 1.0 SP 24
https://launchpad.support.sap.com/#/notes/2743782

DMO with SUM 2.0 SP 06
https://launchpad.support.sap.com/#/notes/2798588

SAP Support Portal
quick link: /sltoolset
http://support.sap.com/slttoolset

SAP Community blog on DMO
https://blogs.sap.com/?p=349580

DMO Guide
- Use the quicklink http://service.sap.com/sapconfluence and navigate to the Maintenance section
- SAP Fact Guidance – Migration BW on HANA using the DMO option in SUM

Blogs on DMO
- Migration to SAP HANA: Overview Video of Database Migration Option DMO
- DMO: introducing the key UI
- DMO: technical background
- DMO: background on table split mechanism
- DMO without software change
- Optimizing DMO Performance
- DMO: optimizing system downtime ...
- DMO: table comparison and migration tools
- DMO: handling table comparison checksum errors
- DMO: introducing the benchmarking tool
- DMO: comparing pipe and file mode for R3load
- DMO: downtime optimization by migrating sap tables during uptime (preview)
- Phases behind DMO R3load parallel export/import during UPTIME and DOWNTIME to target HANA DB
- Short history of DMO

Blogs on related topics
- Migration of SAP Systems to SAP HANA
- A better way to migrate your SAP NetWeaver BW from any database to SAP HANA
- Decision Matrix to Choose Best Migration Option of AS/400 Systems to SAP HANA
- Software Update Manager (SUM): introducing the tool for software maintenance
- Best Practice Guide – Classical Migration of SAP NetWeaver AS AS/400 to SAP HANA
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