Downtime Minimization with SUM 1.0 SP17

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Roadmap to Business Continuity*
considered SUM options for ABAP based Business Suite products

Software Update Manager (SUM)

standard mode

advanced mode (nZDM)

Zero Downtime Option of SUM (ZDO)*

new technology
new procedure

*This is the current state of planning and may be changed by SAP at any time.
# Downtime Optimization - Overview

<table>
<thead>
<tr>
<th>Stack</th>
<th>Method / Tool</th>
<th>Maintenance activity</th>
<th>Technical Downtime</th>
<th>Efforts and Costs (1 = low, 5 = high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABAP</td>
<td>Rolling Kernel Switch</td>
<td>- Kernel Patch</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ABAP</td>
<td>Standard Mode of SUM</td>
<td>- Support Packages</td>
<td>~1-9 hours</td>
<td>2</td>
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<td></td>
<td></td>
<td>- Enhancement Packages</td>
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<td>- Release Upgrades</td>
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<td></td>
<td></td>
<td>- Customer Transports</td>
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<td></td>
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<tr>
<td>ABAP</td>
<td>Advanced Mode of SUM (nZDM of SUM)</td>
<td>- Support Packages, Enhancement Packages, Release Upgrades, Customer Transports</td>
<td>~0.5-6 hours</td>
<td>2 - 3</td>
</tr>
<tr>
<td>ABAP</td>
<td>ZDO of SUM</td>
<td>- Support Packages</td>
<td>0</td>
<td>3</td>
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<tr>
<td></td>
<td></td>
<td>- Enhancement Packages</td>
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<td>- Release Upgrades</td>
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<td></td>
<td>- Customer Transports</td>
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<td></td>
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<tr>
<td>ABAP</td>
<td>NZDT</td>
<td>- Support Packages</td>
<td>~2-4 hours</td>
<td>5</td>
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<tr>
<td></td>
<td></td>
<td>- Enhancement Packages</td>
<td></td>
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<td></td>
<td>- Customer Transports</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td>- OS/DB Migrations</td>
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<td>- Unicode Conversions</td>
<td></td>
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<tr>
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<td></td>
<td>- Data Center Move</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JAVA</td>
<td>nZDM JAVA</td>
<td>- Support Packages</td>
<td>~5-90 minutes</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Enhancement Packages</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>- Release Upgrades</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As-is processes of SUM compared advanced mode and ZDO

V1 = source release  V2 = target release

Standard mode

- Production V1
- Cool down
- Maintenance V1 → V2 (SAP Update only)
- Customer transports
- SGEM
- Ramp up
- Validation
- Production V2

Advanced mode (nZDM)

- Production V1
- Cool down
- Maintenance V1 → V2 (SAP Update + customer release)
- Ramp up
- Validation
- Production V2

ZDO of SUM (SUM 1.0 SP17)

- Production V1
- Cool down
- Maintenance V1 → V2 (SAP Update + customer release)
- Ramp up
- Validation
- Production V2
As-is process of SUM advanced mode (nZDM)

Advanced mode (nZDM)

production V1

cool down

maintenance V1 → V2
(SAP Update + customer release)

ramp up
validation
production V2

business downtime
technical downtime

V1 = source release  V2 = target release
Advanced mode of SUM for ABAP based SAP systems

- Parallel operation of production system and shadow system
- Import of the substitution set into the shadow tables during production operation (extended shadow) enables the following in uptime
  
  - Activation ABAP loads (SGEN)
  - near-Zero Downtime Maintenance (nZDM, GA since SL Toolset SP12)
  - Customer transports import (GA since SL Toolset SP14)
Focus on downtime minimization in SUM advanced mode

Big picture

### SUM standard mode

- **Installation preparation**
- **Shadow operation**

### SUM advanced mode

- **Installation preparation**
- **Shadow operation**
- **Extended shadow operation**

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### Uptime

**SUM**

- System cool down

### Business Downtime

**SUM**

- Technical downtime (system update)
- Customer transports, add-ons...
- Technical downtime (system update + custom transports)

**SGEN**

- Test & verification
- System ramp up

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**Savings of 40-60%**

**Savings app. 50%**

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Obsolete

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Maintenance downtime improvements realized with nZDM
Reference customer example (SAP ERP system, EHP update)

<table>
<thead>
<tr>
<th>EHP Installer (Feb. 2012)</th>
<th>Business Downtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool down</td>
<td>Technical downtime</td>
</tr>
<tr>
<td>2:45 h</td>
<td>9:00 h</td>
</tr>
<tr>
<td>Transports &amp; manual steps</td>
<td>Validation &amp; ramp up</td>
</tr>
<tr>
<td>4:30 h</td>
<td>2:00 h</td>
</tr>
<tr>
<td>18:15 h</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUM with nZDM (July 2012)</th>
<th>Business Downtime</th>
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<td>Cool down</td>
<td>Technical downtime</td>
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<td>2:30 h</td>
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</tr>
<tr>
<td>11:15 h</td>
<td></td>
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<td>2:15 h</td>
<td>2:00 h</td>
</tr>
<tr>
<td>9:45 h</td>
<td></td>
</tr>
</tbody>
</table>

Technical downtime - 70%
Business downtime - 53%
As-is process of ZDO*
Zero Downtime Option of SUM

Motivation

perform upgrades of the ABAP applications without technical downtime and almost no business downtime
Zero Downtime Option (ZDO) of SUM
Solution approach

The idea

All common cars can take the lanes

use existing lanes

under construction

restricted speed

The ZDO solution approach

release 1

maintenance

release 2

By default all daily processes can be used during upgrade procedure

No system copy / clone

use existing DB (minimal DB footprint)

maintenance mode
Zero Downtime Option of SUM

Maintenance procedure without technical downtime

Instances
- SUM

Shadow
- V1 -> V2

Upgrade
- V1 -> V2
- V2

Production
- V1
- V2

- Upgrade procedure starts in shadow
- Technical validation (optional)
- Back on productive system
- Technical validation / business validation (optional)
- Cool down incl. restart
- Bus. down time
- Uptime

V1 = start release
V2 = target release
The „Bridge“ and „Upgrade“ are not separate systems but defined as „sub-systems“

The zero downtime procedure works “in-place”
- all actions are performed within the same database,

Tables are
- Shared or
- upgrade and dialog get different views on the tables or
- upgrade and dialog get different structures of tables
Zero Downtime Option of SUM
Maintenance procedure without technical downtime

SUM milestones

Config./Checking  Pre-processing  Execution  Post-processing

Instance(s)

Prod.  dialog instance  prod. instance (bridge phase)

Production DB schema

original schema  bridge views  original schema

Shd./Upgr

shadow  update instance

Upgrade DB schema

original schema  original schema

uptime (maintenance mode)  downtime  uptime

cool down of start release and ramp up of target Release

soft reconnect to Bridge schema
Continuity of your standard business during upgrade

The Zero Downtime Option of SUM performs the phases of the execution roadmap step in uptime.

The ZDO considers customer transport requests:
- Use of customer buffer to add customer transport requests to ZDO procedure
- All customer transports are imported and activated in uptime

The SUM calls main manual post-processing steps after update automatically in uptime, e.g. RGZZGLUX, RV80HGEN.
<table>
<thead>
<tr>
<th>considered level of db access conflicts</th>
<th>considered potential conflict ratio</th>
<th>where applied</th>
<th>impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Base</td>
<td>100%</td>
<td>SUM single system mode</td>
<td>• Update runs completely in downtime</td>
</tr>
<tr>
<td>low granular classification of DB tables</td>
<td>95%</td>
<td>SUM advanced mode</td>
<td>• App. 40% - 50% reduction of technical downtime</td>
</tr>
</tbody>
</table>
| DB table                               | 0.1%                                | ZDO of SUM     | • zero downtime during upgrade  
|                                       |                                     |               | • access to some DB tables restricted to read only mode |
| DB table row level                     | 0.01%                               | ZDO of SUM     | • zero downtime during upgrade  
|                                       |                                     |               | • access to DB table line item restricted to read only mode |
Estimation of size and time for cut-over planning

Reference: recommended size for the shadow instance in the SUM advanced mode

- Software Update Manager procedure: ca. 140 GB
- advanced mode (incl. nZDM, customer transports): ca. 80 – 350 GB

The hardware resource demand for ZDO is expected to be comparable

Factors of ZDO procedure runtime

- upgrade procedure (SUM standard mode)
- setup of bridge system
- customer transports

The overall runtime is only predictable with comparable tests / history
Zero Downtime for the Business

Goal

Common business without any restrictions during the update procedure
How SAP ensures the enablement of ZDO?

By default the daily business transactions of the enabled applications are fully available during the Zero Downtime upgrade procedure of SUM

ZDO related quality process at SAP:

- SAP standard application enablement is additionally verified with functional tests during upgrade procedure
- Development activities
  - XPRA’s / AIM enablement
  - Technical checks of SAP development to avoid negative / unforeseen consequences for the ZDO procedure

Known restrictions of business applications / customer transports are listed in the ZDO release note [Prerequisites and Restrictions of Zero Downtime Option of SUM](#)
ZDO enablement for third party / custom coding

Third party addons are not enabled for ZDO when they use XPRAs / AIMs

- Third party supplier need to get in contact with SAP to verify the AIMs and XPRAs

Customer transport requests / third party applications need to be evaluated

- Considering basic development rules regarding table conversions
ZDO in 2015/2016: available for pilots on project basis

Close cooperation with app. 30 customers in more than 100 system updates on

- SAP ERP
- SAP EWM
- SAP CRM
- SAP NetWeaver

ERP related upgrade projects with Industry solutions:

- DIMP
- Retail / Wholesale
- Chemical Industry
- Consumer Products
- IT industry / Telco
- Utilities
Experiences made in customer pilot projects so far

Simulate usual business on bridge sub-system at customer pilots / SAP IT pilots

- **Any business restrictions?**
  - Check of user complaints
  - Dumps
  - Job handling
- **Any complains about performance restrictions?**
  - Leverage business to SUM activities
  - Complaints about performance issues for specific transactions

Findings

- No unexpected functional restrictions, some bugs in table classification (corrections were needed)
  - Sandbox test needed for productive upgrade validation
- No complaints about performance
  - Admin has to leverage the parallel load from business and SUM during execution phase
**ZDO Upgrade Scope**

**Start**
- ERP 6.16 EHP 6 SP 7
- NW 7.40 SP 7
- Kernel 742

**Target**
- ERP 6.17 EHP 7 SP 7
- NW 7.40 SP 9
- Kernel 742

**System Profile**
- SID: IFP
- DB size 2.2TB, compressed :1TB
- Average concurrent users: ca. 800 – 1.200
- Hosted applications: Project Management, HR and other custom apps

**Appraisal**
- Flexibility of Bridge duration: final cut over must not immediately follow the technical upgrade
  - flexibility in scheduling the cut over
- minimum extra efforts in total for running ZDO with respect to “classical” SUM upgrade procedure.
  - ZDO is still a SUM procedure
  - Trace of memory needed (during shadow and bridge additional memory is needed)

**Goal**
- Procedure verification regarding effort, usability and benefit goal: Rollout for SAP IT in general
ZDO upgrade scope

- DB: SAP ASE
- Start Release: SAP ERP EHP7 SP4, SAP NW 7.40 SP6
  DB: SAP ASE 15.7
- Target release: SAP ERP EHP7 SP8, SAP NW 7.40 SP10

Goal for ERP systems

- Business Downtime max 3h

Achievements

- Full scope of applications was available during ZDO upgrade
- Business downtime needed for
  - Cool down (backup, user log of, lock users, empty LIS queues etc.): 15 minutes
  - Restart: 30 minutes
  - Manual post-processing activities: 2.5 hours
  - Business Validation tests 20 minutes

Further plans

- Optimize the procedure to reach 2h overall business downtime
ZDO Productive upgrade @

ZDO upgrade scope of P01
- Start Release: SAP ERP EHP7 SP5, SAP NW 7.40 SP7
  DB: Oracle 11.2.0.4
- Target release: SAP ERP EHP7 SP7, SAP NW 7.40 SP9

Goal
- Minimize the business downtime from one weekend to close to zero
- Downtime reduction of all SAP systems in the landscape

Further plans
- Go ahead in close cooperation with SAP
  - Use ZDO for customer release as well
  - Quick rollout to the entire landscape (ERP, GTS, EWM, F&R) in order to perform integrated processes during maintenance in uptime

Achievements
- Upgrade according to cut over plan
- Full scope of applications was available during ZDO upgrade
  - But: Two unexpected issues led to timely restrictions of availability
- Business downtime needed for Restart
  - Additional activities to empty LIS queues: 20 minutes
  - Manual post-activities due to the unexpected issues during bridge: 40 minutes
  - Restart: 15 minutes

Appraisal
- Close and trustful cooperation, quick reaction time
- 2 Unplanned business restrictions were the most critical situation of the upgrade
- SUM UI needs improvements
- The ZDO procedure needs some check improvements to reduce the issues during runtime
- Improve the current documentation
Focus of ZDO*
ZDO enablement for products / DB according to current roadmap

Updates for SAP Business Suite, minimum start release:
- SAP ERP – ERP 6.0 EHP7 SP6 / NW 7.40 SP8 ¹
- SAP CRM – CRM 7.0 EHP3 SP8 / NW 7.40 SP8 ¹
- SAP NetWeaver 7.40 SP8 ¹

- SAP EWM – EWM 9.1 SP2 / NW 7.40 SP8 ¹
- SAP GTS – GTS 11.0 SP0 / NW 7.40 SP8 ²
- SAP Banking Services – BaS 9.0 SP00 / NW 7.50 SP1 ²

Minimum database release:
- SAP HANA 1.00.9
- SAP ASE 16.0.02.03
- Oracle 11.2.0.4
- IBM DB z/OS (DB2) 11.1.5
- Further DBs on project basis:
  - MS SQL 11.0
  - IBM DB2 LUW (DB6) 10.5 FP5
  - MaxDB, DB2 iSeries

¹ Available on request with SUM 1.0 SP16
² available on projects basis

* For detailed enablement details see SAP note 2163060
Regarding used AddOns, a pre-check is needed

Pre-requisites: Unicode system required

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Availability Details

What does “available on project basis” mean?
- The project is based on a service contract; SAP Support (AGS) or SAP Consulting are involved
  - Workshop to define scope, functionality and schedule
  - Direct support as defined
  - Cookbook optimization
- SAP Development supports your project directly in close cooperation with SAP AGS / Consulting

What does “available on request” mean?
- The product / DB combination is enabled and validated with SUM 1.0 SP16
- Proven strategy for shipping new SUM functionality: Technically it is GA, but SAP Lifecycle Management wants to control it
- The SAP Software Lifecycle department is still in close cooperation to you, our customers and need your feedback
  - Request to use ZDO via OSS message
  - Telco to verify scope, answer questions, explain tasks for prep and execution
  - Productive support on request
  - Service support still recommended for knowledge ramp up / cookbook optimization
Zero Downtime Option of SUM (ZDO) is ready to use

- ZDO considers the overall business downtime of our customers
  - Today: reduce business downtime to a restart
  - Goal: reduce business downtime to some minutes
- ZDO is an option of SUM in SL Toolset
- Customer transports are included
  - Adopts release cycles from partners and customer releases much faster

✓ ZDO is available on request
✓ ZDO is successfully tested in various customer projects since 2015
✓ ZDO is verified for SAP ERP, SAP CRM and SAP NetWeaver on most common DB

ZDO is validated and available on request (SAP note 2163060)*

* Current state of planning and can be changed by SAP at anytime
Key links for more information

SCN Blog:
Zero Downtime Option of Software Update Manager is available on project basis

SAP News:
http://www.news-sap.com/getting-one-downtime/
Thank you

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