

# REPLICATOR

FOR MICROSOFT DYNAMICS NAV<sup>®</sup>

## ADMINISTRATOR'S GUIDE 4.30





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## **PREFACE**

This guide describes how to install, set up and use Replicator for Microsoft Dynamics NAV.

It is intended for system administrators who want to set up and maintain Replicator.

It is assumed that you are familiar with the following:

- Your LAN/WAN environment.
- NetBIOS and/or TCP/IP.
- Navision 3.56 (old textbased version), Navision Financials, Navision Attain, MBS-Navision or MS Dynamics NAV.

This guide is made up of eight chapters and four appendixes. The first chapter contains basic information about the functions of Replicator. Chapter two guides you through the installation process of Replicator. Chapter three and four deals with setting up the software as well as more detailed information about the special facilities in Specifications. Chapter five deals with the Replicator Server. Chapter six shows how to run Replicator from the command line prompt. Chapter seven describes how to run tasks as services and the last chapter guides you through an advanced example of setting up transfers of customers. Appendixes contain information on troubleshooting, description of Source Counter and Action code in MS Dynamics NAV 3.70 or later, new features and document history.

Each chapter or appendix starts with a brief description of the contents in it. This will help you decide if this is where the information you need is located.

Below is a list of other publications you might wish to read:

- **Microsoft Dynamics NAV Administrator's Guide**
- **Introduction to MS Dynamics NAV**
- **MS Dynamics NAV Installation and System Setup**

## Preface

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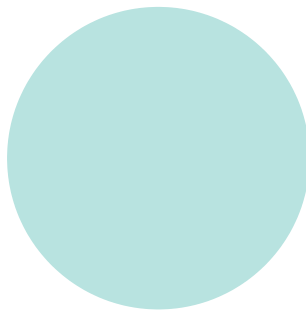
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# Chapter 1

## Getting Started

This chapter briefly describes what Replicator for Microsoft Dynamics NAV is and gives an introduction to its different modes of transfer.



## 1.1 GENERAL DESCRIPTION

In this Administrators Guide MS Dynamics NAV covers Navision Financials, Navision Attain, MBS-Navision and MS Dynamics NAV except if version number is mentioned.

If version number is mentioned it only regards that version.

Replicator for Microsoft Dynamics NAV is a program that enables you to transfer data to/from the following:

- Navision Financials databases (ver. 2.0, 2.50 or 2.60d)  
Navision Attain (ver. 3.0, 3.10 or 3.60)  
MBS-Navision 3.70 and 4.0  
(both local databases as well as databases running on MBS-Navision and MS-SQL Servers).  
MS Dynamics NAV 4.01, 4.02, 4.03, 5.0, 5.01 and 2009  
(both local databases as well as databases running on MS Dynamics NAV and MS-SQL Servers).
- Navision databases ver. 3.56 (old textbased version)  
(both local Navision databases as well as databases running on Navision servers).

Replicator for Microsoft Dynamics NAV uses C/Front for MS Dynamics NAV to access both the source database and the destination database at the same time (With Navision 3.56, C-Toolkit is used). This enables a secure and controlled comparison and update of data directly between the databases.

The Replicator Setup Application in which you set up Replicator is installed in an MS Dynamics NAV database. When running Replicator it reads setup tables in the MS Dynamics NAV database to find out which data should be transferred (table numbers and fields) as well as, from which database (the source database) to which database (the destination database) the data should be transferred. If you install the Replicator Setup Application in your main database you will be able to access it from any MS Dynamics NAV workstation.

## Replicator features

Replicator offers different features which you can make use of, for example:

- Specifications:  
You specify what should be replicated, and from where to where in Specifications.
- Replication of entire table:  
Replication of the entire table automatically replicates all fields in a specified table, to the same table in the destination database. Each time the replication is run, it determines which fields are in the table and replicates these fields (i.e. you don't have to change the replication setup, if you add fields to the table!).
- Replication of specified fields only:  
The replication of specified fields, lets you specify exactly which fields in a table should be replicated. You can even replicate data between different tables, for example, from a posting table to the general ledger.
- Replication of the ToDo table:  
The ToDo table replication, implements a simple way to send messages between two or more databases. This can be used for a number of different purposes. For example, you could summarize postings in the source database, and replicate the sum-postings to another database and post them there.
- Execution of Actions:  
The Action table facility is a kind of a dictation machine to Replicator where you can dictate exactly what should be done in the destination database e.g. update customer no. 70000 etc.
- Replication of MS Dynamics NAV objects:  
You can replicate MS Dynamics NAV objects between MS Dynamics NAV databases.

- **Source Counter:**  
Another feature that is very useful is the Source Counter feature. This feature makes it easy to replicate only changed data from a source to a destination database, and even allow Star Replication if needed. Star Replication means that a source sends modifications to a central destination, and this central database then forwards those changes to other databases, replicating them with the central database.
- **Activity Register:**  
Under Activity Register, Replicator writes a log telling what it has done, such as statistics on each replication or error messages if any. This log is written to the central database where the setup also resides.
- **Change Register:**  
Logging changes that occur to data when replicating is also possible. These changes will be shown in the Change Register.
- **Scheduler:**  
Here you can create Scheduler jobs which can run Specifications or Groups of Specifications at a certain time. You can also create a Scheduler job calling MS Dynamics NAV codeunits to be run at a certain time.
- **Replicator Backup facility:**  
This replication mode can be used in order to keep a backup server (an extra MS Dynamics NAV server) up-to-date with all changes made on the primary MS Dynamics NAV server.
- **The BackupCompare facility:**  
By using this replication mode you can make a comparison of the backup server and the primary MS Dynamics NAV server. Replicator will write the differences (if any) into the Activity Register and the Change Register (if enabled).
- **CompanyImport and CompanyExport:**  
With these two replication modes you will be able to replicate a specific Company from the main database to a laptop and assure that nobody else will be able to edit the Company on the main database while having it on the laptop until you have replicated it back with all the new changes.

- Replicator Server:  
The Replicator Server facility reduces the total replication time significantly when using mobile phones or internet. When an MS Dynamics NAV table is accessed, the Replicator Server ensures that only the description of the fields and table is send to the client. Normally, the C/AL-Code included in the table is send as well.  
In addition, records are gathered in a package (e.g. 500 records in one package), compressed and then send.
- Replicator Service Manager  
The Replicator Service Manager enables you to have either the Replicator Server or Scheduler running as a Windows Service.

The features mentioned are explained in detail in chapter three, four, five, six and seven. In chapter eight you will also find an advanced example of setting up transfers of customers using Source Counter and Actions.

The feature “The Replicator Command Center” is described in a separate manual “Command Center Guide 4.30”

- Command Center  
The Command Center is a graphical application you can use in order to run Replicator Specifications, start Replicator in Scheduler mode or/and start Replicator as a Server.

## Chapter 1. Getting Started

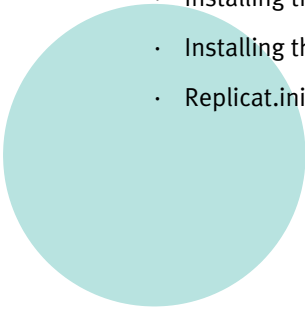


## Chapter 2

### Installing Replicator for Microsoft Dynamics NAV

This chapter explains how to install Replicator for Microsoft Dynamics NAV.

Contents are:

- System Requirements.
  - Quick installation and setup list.
  - Contents of the Replicator installation CD.
  - Installing the Replicator program.
  - Installing the Replicator Setup Application.
  - Replicat.ini (Replicator INI Editor).
- 

## 2.1 SYSTEM REQUIREMENTS

You need the following hardware and software to install and use Replicator for Microsoft Dynamics NAV.

- Computer with at least 512 MB RAM.
- Windows-2000 Service pack 1 or later, Windows-XP Professional, Windows Vista, Windows 7, Windows 2000 Server or later.
- MS Dynamics NAV.  
Your MS Dynamics NAV License, `fin.flf`, must have access to C/Front and to the Replicator objects, or
- Navision Financials 1.30, 2.0, 2.01, 2.50, 2.60d, or
- Navision Attain 3.0, 3.10, 3.60 (MS-SQL Server option is also supported) or,
- MBS-Navision 3.70 or 4.0 (MS-SQL Server option is also supported).
- MS Dynamics NAV 4.01, 4.02, 4.03, 5.0, 5.01 or 2009 (MS-SQL Server option is also supported).
- Replicator installation CD with license file `replicat.dat`.
- A TCP/IP or NetBios connection from the computer where Replicator is installed to each of the databases you want to replicate with. The connection can be a dial-up connection as long as it is automatically established when the MS Dynamics NAV server is requested.
- Navision 3.56 (with a `navi_inf.dat` with C-Toolkit access and access to table 4826 and 4831) – **only if** you need to transfer data to/from Navision 3.56.

## 2.2 QUICK INSTALLATION AND SETUP LIST

In this section we will outline the steps to follow to install and set up Replicator for use with MS Dynamics NAV. Please check out the respective sections for a complete discussion.

- 1 Install the Replicator program.  
(Section 2.4)
- 2 Install the Replicator Setup Application.  
(Section 2.5)
- 3 Ensuring access to the MS Dynamics NAV databases.  
(Section 2.6)
- 4 Edit `replicat.ini` (Replicator INI Editor).  
(Section 2.7)
- 5 Set up databases in the Replicator Setup Application.  
(Section 3.3)
- 6 Set up Specifications in the Replicator Setup Application.  
(Section 3.4)
- 7 Run Replicator.  
(Section 6.1)

## 2.3 CONTENTS OF THE REPLICATOR INSTALLATION CD

Below you will find a description of the files placed on the Replicator for Microsoft Dynamics NAV installation CD.

File Name	File Description	File Destination
\Program\		
readme.txt	A text file containing a description of the contents of the installation CD as well as the latest information about Replicator for Microsoft Dynamics NAV. When you have installed Replicator, you can read the file by choosing: Start > Programs > Replicator for MS Dynamics NAV > Readme	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
license.txt	A text file containing the Replicator for Microsoft Dynamics NAV license agreement.  When you have installed Replicator, you can read the file by choosing: Start > Programs > Replicator for MS Dynamics NAV > License	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
replicat.dat	The Replicator for Microsoft Dynamics NAV license file. This file contains license specific information like user name, license number etc. Do not edit this file.	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT In addition the file is copied to your computer's "system32" directory. For example: "C:\Winnt\System32"

File Name	File Description	File Destination
rep.fob	The MS Dynamics NAV object file containing the Replicator objects. This is the file required in order to install the Replicator for Microsoft Dynamics NAV Setup Application. PLEASE NOTE: If you only want to install the Replicator for Microsoft Dynamics NAV Setup Application, you can choose to import the file directly from the installation CD. For further information, please refer to section 2.5.	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
Replicator-Functions_370.fob	This MS Dynamics NAV object file contains a replacement of Codeunit 64825 "Replicator Functions" with additional functionality for use in MBS-Navision 3.70 or later.	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
repnt.exe	The Replicator executable file.	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
repcom.exe	The Replicator Command Center executable file. For further information, please refer to the Replicator for Microsoft Dynamics NAV Command Center Guide 4.30. When you have installed Replicator, you can enter the Replicator Command Center by choosing: Start > Programs > Replicator for MS Dynamics NAV > Command Center	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT

## Chapter 2. Installing Replicator for Microsoft Dynamics NAV

File Name	File Description	File Destination
replicat.ini	The Replicator initialization file. In this file you specify where Replicator should locate the Replicator Setup Information. When you have installed Replicator, you can edit the parameters within replicat.ini by choosing: Start > Programs > Replicator for MS Dynamics NAV > Replicator INI Editor	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
repini.exe	The "Replicator INI Editor" executable file. See description of replicat.ini.	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
replicat.uk	The Replicator language file. This file contains all messages used by the Replicator program. Do not change this file.	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT In addition the file is copied to your computer's "system32" directory. For example: "C:\Winnt\System32"
repnt.cpl	The Replicator Service Manager file. When you have installed Replicator, you can enter the Service Manager from the Control Panel window. For further information, please refer to chapter 7.	Your computer's "system32" directory For example: "C:\WINNT\SYSTEM32\

File Name	File Description	File Destination
repag430.pdf	The Replicator for Microsoft Dynamics NAV Administrator's Guide 4.30 in PDF format. If you have Adobe Acrobat Reader installed on your computer, you can when Replicator has been installed, enter the guide by choosing: Start > Programs > Replicator for MS Dynamics NAV > Help > Administrators Guide	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
repcc430.pdf	The Replicator for Microsoft Dynamics NAV Command Center Guide 4.30 in PDF format. If you have Adobe Acrobat Reader installed on your computer, you can when Replicator has been installed, enter the guide by choosing: Start > Programs > Replicator for MS Dynamics NAV > Help > Command Center Guide	The directory where you choose to install Replicator. The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
repnt.isu	The uninstall file regarding Replicator for Microsoft Dynamics NAV.  How to uninstall Replicator is described in section 2.4.	The directory where you choose to install Replicator.  The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT
db.ico	The Data Backbone Software A/S icon file.	The directory where you choose to install Replicator.  The default destination directory is: "C:\Program Files\Data Backbone Software\REPNT

**Chapter 2. Installing Replicator for Microsoft Dynamics NAV**

File Name	File Description	File Destination
sched.cmd	A command file you can use in order to start the Scheduler regarding jobs of the type “Replicator” from the command line prompt.	<p>The directory where you choose to install Replicator.</p> <p>The default destination directory is: “C:\Program Files\Data Backbone Software\REPNT</p>
rep.obj	If you want to be able to set up Replicator in a Navision 3.56 database, you can use this Navision 3.56 object file. The file (rep.obj) is imported into the Navision 3.56 database where you want to setup and maintain Replicator.	<p>The directory where you choose to install Replicator.</p> <p>The default destination directory is: “C:\Program Files\Data Backbone Software\REPNT</p>
traceon.cmd	<p>A command file you can use in order to enable the “CTRACE” environment variable.</p> <p>When enabled, information about what Replicator has been doing while running is written in the file “Trace.txt”.</p> <p>For more information, please refer to Appendix A.</p>	<p>The directory where you choose to install Replicator.</p> <p>The default destination directory is: “C:\Program Files\Data Backbone Software\REPNT</p>
traceoff.cmd	A command file that will disable the “CTRACE” environment variable.	<p>The directory where you choose to install Replicator.</p> <p>The default destination directory is: “C:\Program Files\Data Backbone Software\REPNT</p>



File Name	File Description	File Destination
<b>\Extras\</b>		
nc_netb.dll	The Netbios driver for Replicator. This file is only required, if an MS Dynamics NAV database uses NetBIOS as Network Protocol.	This file will not be copied during the installation.  If required, you have to copy the file manually to the main directory of your MS Dynamics NAV Client.
nc_netb.nd1	The Netbios driver for Replicator. This file is only required if a Navision 3.56 uses NetBIOS as Network Protocol.	This file will not be copied during the installation.  If required, you have to copy the file manually to the main directory of your Navision 3.56 Client.
repguide.pdf	The Replicator for Navision 3.56 Administrator's Guide in PDF format. You can use Adobe Acrobat Reader to read and/or print the guide.	This file will not be copied during the installation.
<b>\Adobe\</b>		
AR60.exe	By running this file from the installation CD, you will install Adobe® Acrobat® Reader on your computer.  We have included Replicator manuals on the installation CD in PDF format. To read and/or print these guides you need Adobe Acrobat Reader.	This file will not be copied during the installation.

## 2.4 INSTALLING REPLICATOR

On the computer from where you want to run Replicator you install the Replicator files.

To install Replicator you insert the installation CD and if “Autorun” is activated, the installation Program starts automatically. If not, you locate and run the installation file `setup.exe`.

The directory where you choose to install Replicator, will be referred to as the Replicator main directory. The Replicator execution file (`repnt.exe`) resides in this directory.

### Installation step by step:

- 1 Insert the Replicator installation CD into the CD-ROM drive.
- 2 If “Autorun” is not activated, locate the installation file `setup.exe` on the CD and run it.
- 3 Follow the installation instructions on the screen.

### Uninstalling Replicator

To uninstall Replicator for Microsoft Dynamics NAV, you enter the Control Panel window and choose “Add/Remove Programs”.

From the list you select “Replicator for MS Dynamics NAV 4.30” and click “Add/Remove”.

#### Important...

.....  
Before uninstalling Replicator for Microsoft Dynamics NAV please remember to remove all Services from the Replicator Service Manager window.  
.....

## 2.5 INSTALLING THE REPLICATOR SETUP APPLICATION

The Replicator Setup Application is where you set up the databases you want to replicate data between as well as the Specifications that determine which data is transferred between the databases.

You install the Setup Application by importing an object file into the MS Dynamics NAV database where you want to set up and maintain Replicator. This object file is included on the Replicator installation CD (`rep.fob`) and contains all the needed Replicator tables, forms, reports and codeunits.

Your main MS Dynamics NAV Server database would normally be the MS Dynamics NAV database where you choose to keep the Replicator Setup Information.

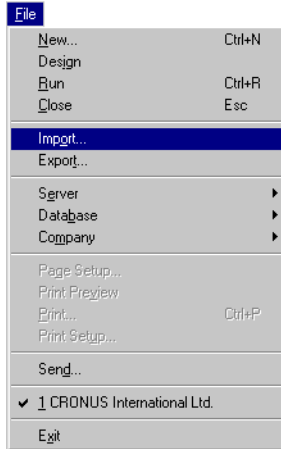
When you have imported the Replicator object file you have to insert the Replicator Submenu button, as it is usually done.

### Installation step by step:

- 1 Select Tools and Object Designer.



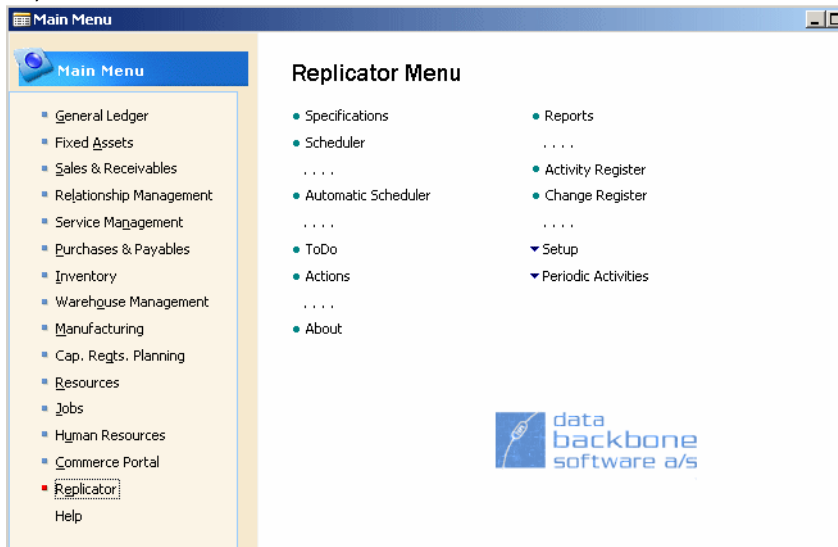
2 Select File and Import.



3 Locate the file `rep.fob` on the Replicator installation CD or in the directory where you have installed Replicator and choose yes to import.

4 You have to insert the Replicator submenu button yourself. Place the Replicator menu (form 64842) in the main MS Dynamics NAV menu (form 330).

Now you can select the Replicator main menu and you are ready to set up Replicator.



## 2.6 ENSURING ACCESS TO THE MS DYNAMICS NAV DATABASES

Whenever access to a database is required, certain MS Dynamics NAV files are used to provide this access. These files are used whether it is access for data transfer purposes or access to the database containing the Replicator Setup Application. The files required reside within the main directory of your MS Dynamics NAV Client except for the following which you have to copy manually into the main directory of your MS Dynamics NAV Client.

### Notice that...

.....

If you manually copy the required files directly from a CD you must ensure that the files are not write protected.

Always ensure that you use the correct version of the file `cfront.dll`. To ensure this, check that the file corresponds with the version of MS Dynamics NAV in use. Also ensure that the TimeStamp of the files `cfront.dll` and `dbm.dll` are identical.

.....

Later on, you will have to specify the path to where you installed the needed MS Dynamics NAV files (Installation Path).

### MS Dynamics NAV databases (local or running on an MS Dynamics NAV server)

**■** If you want to replicate data from/to an MS Dynamics NAV database (whether it is a local database or running on an MS Dynamics NAV server):

- 1 Copy the following files into the main directory of your MS Dynamics NAV Client:

`cfront.dll`

`fin.flf`

Must have C/Front access.

`nc_netb.dll`

Netbios driver for Replicator (only if you use Netbios).

### MS Dynamics NAV databases (running on an MS-SQL Server)

**■** If you want to replicate data from/to an MS Dynamics NAV database running on an MS-SQL Server:

- 1 Copy the following files into the main directory of your MS Dynamics NAV Client:

`cfrontsql.dll`

---

`fin.flf`                      Must have C/Front access.

### Navision 3.56 databases (old textbased ver.) (local or running on a Navision 3.56 server)

**■** If you want to replicate data from/to a Navision 3.56 database (whether it is a local database or running on a Navision 3.56 server):

- 1 Copy the following files into the main directory of your Navision 3.56 Client:

`dbl.ndl`                      Navision database access library for 3.56.

---

`navi_inf.dat`                Must have C-Toolkit access.

---

`nc_netb.ndl`                Netbios driver for Replicator (only if you use Netbios).

## A list of all the files used to access the MS Dynamics NAV databases

### MS Dynamics NAV databases (local or running on an MS Dynamics NAV server)

The following files are used to access an MS Dynamics NAV database (whether it is a local database or running on an MS Dynamics NAV server):

cfront.dll

---

dbm.dll

---

fin.etx

---

fin.flf                    Must have C/Front access.

---

fin.smt

---

fin.stx

---

nc\_netb.dll            Netbios driver for Replicator (only if you use NetBios).

---

nc\_tcp.dll

---

slave.exe

### MS Dynamics NAV databases (running on an MS-SQL Server)

cfonstsqldll.dll

---

fin.etx

---

fin.flf                    Must have C/Front access.

---

fin.smt

---

fin.stx

---

ndbcs.dll

**Navision 3.56 databases (local or running on a Navision 3.56)**

dbl.ndl	Navision database access library for 3.56.
navi.etx	
navi.smt	
navi.stx	
navi_dcn.exe	
navi_inf.dat	Must have C-Toolkit access.
navi_ni.ndl	
navi_sr.ndl	
nc_netb.ndl	Netbios driver for Replicator (only if you use NetBios).
nc_tcp.ndl	

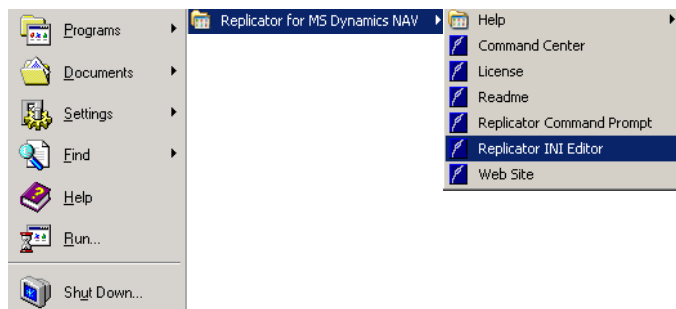


## 2.7 REPLICAT.INI (REPLICATOR INI EDITOR)

On the computer from where you want to run Replicator you have to specify where the Replicator Setup Information is located.

This is done by specifying parameters within `replicat.ini`.

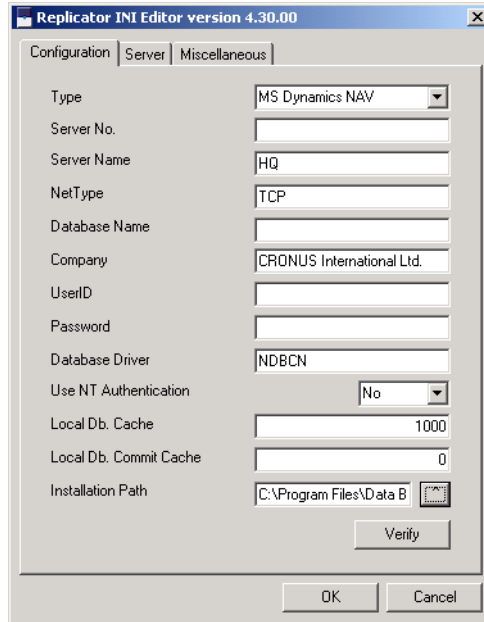
You can edit `replicat.ini` by entering the Replicator INI Editor situated under “Programs” in the Start menu.



### The tab “Configuration”

- 1 Choose Start > Programs > Replicator for MS Dynamics NAV > Replicator INI Editor and the tab “Configuration”:

**Chapter 2. Installing Replicator for Microsoft Dynamics NAV**



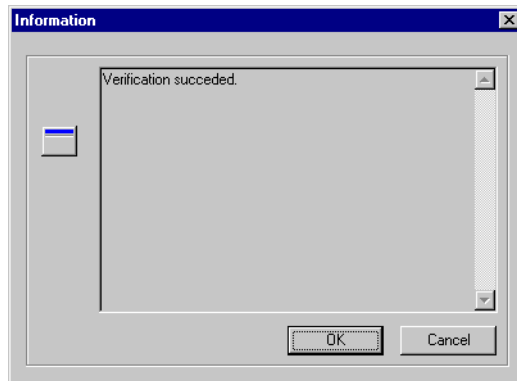
**2 Specify in which database you set up and maintain Replicator.**

The fields of the Replicator INI Editor are described as follows:

Parameter	Parameter Description
Type	Here you specify, if the database is a Navision 3.56 or an MS Dynamics NAV database.
Server No.	If the database is hosted by a Navision 3.56 server, the server number is specified here.
Server Name	If the database is running on an MS Dynamics NAV server or on an MS-SQL Server, you specify the name of the server here.
NetType	If the database is hosted by a server, you specify the network protocol type here. Can be either TCP/IP (apply “tcp”) or NetBIOS (apply “netb”). If nothing is entered, the default is NetBIOS.  If the database is hosted by an MS-SQL Server, this parameter is specified differently. Please refer to the MS Dynamics NAV for MS-SQL Server on-line help.

Parameter	Parameter Description
Database Name	If the database is hosted by an MS-SQL Server, you specify the name of the database here. If the database is a local database you leave the parameters "Server No." or "Server Name" and "NetType" blank and specify the exact location of the database (path and name).
Company	Specify the name of the Company that should keep the Configuration data (the Specifications etc.). PLEASE NOTE: Company name is case sensitive!
UserID	If the database is protected by UserID and Passwords, you specify a UserID here. Since Replicator only needs access to read and write to tables it is a good idea to create a specific UserID for Replicator and give it access to all tables, both read and write, but remove all access to forms and codeunits, this will render the UserID useless for all others, but Replicator.
Password	Apply the Password for the UserID here, if any.
Database Driver	By default this parameter is set to NDBCN (i.e. the database is placed on an MS Dynamics NAV server). If the setup database is placed on an MS-SQL Server you specify NDBCS instead.
Use NT Authentication	If you use the same UserID and Password to access the database as for logging on to your Windows NT platform, you can set this parameter to "Yes". If you do this then leave the parameters UserID and Password empty. PLEASE NOTE: "Use NT Authentication" is only valid from version 2.50 of Navision Financials.
Local Db. Cache	If the database is a local database you can specify a size for cache settings. For further information about Cache, you can refer to the on-line MS Dynamics NAV help under the Contents subject "Dictionary".
Local Db. Commit Cache	If the database is a local database you can specify a size for commit cache settings. For further information about Commit Cache, you can refer to the on-line MS Dynamics NAV help under the Contents subject "Dictionary".
Installation Path	Specify the path to the main directory of your MS Dynamics NAV or Navision 3.56 installation.

With the button “Verify” you can check that access to the database is possible using the specified parameters. If this verification is successful, it means that the Replicator INI Editor will be able to use this Configuration.



Another way to tell Replicator how to get to the setup database is by using a number of command line parameters (see section 6.2).

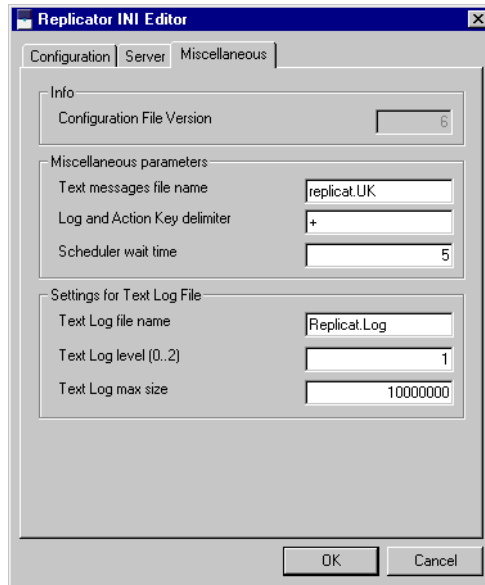
### The tab “Server”

**■** The tab “Server” will be described in section 5.2.

### The tab “Miscellaneous”

**■** Within the tab “Miscellaneous” you can specify parameters dealing with issues such as logging of Replicator messages in a text file.

Below the picture is a description of all the different parameters situated within this tab.



## Info

Parameter	Parameter Description
Configuration file version	This parameter is used to check that Replicator executable and this configuration file are of same version.

### Miscellaneous parameters



Parameter	Parameter Description
Text messages file name	This parameter must be the name of the text messages file. The text messages file contains all text messages and error messages used by Replicator. This parameter should not be changed from the default value <code>replicat.uk</code> .
Log and Action Key Delimiter	When specifying the key in Actions and when logging changes in the databases Replicator as standard use a '+' to specify separation of the values in the primary key. If you for any given reason find this inconvenient you can change this here with specifying the character you wish to use as a delimiter.
Scheduler wait time (seconds)	Here you can specify how often Automatic Navision Scheduler jobs should be repeated. This you can also specify in the field Repeat Interval (sec.) in the tab, Navision Scheduler in Replicator Setup (see section 3.2).

### Settings for Text Log File



Parameter	Parameter Description
Text Log file name	By default this parameter is set to "Replicat.log". That means, Replicator will, when run, generate a separate log file ( <code>replicat.log</code> ) where you can see what happened during execution. The file will be placed within the main directory of Replicator. If Replicator is unable to write information to the Activity Register, you can always use the Replicat.log file to see what happened.
Text Log Level	This parameter defines the type of information logged to the file. 0=nothing, 1=error messages only and 2=all messages.

Parameter	Parameter Description
Text Log max size	<p>This parameter is the maximum size in bytes the Replicator Log file is allowed to grow to.</p> <p>If the Log file grows beyond this size, all Log file messages will be written to the screen and additional error messages stating that the Log file should be deleted are also written to the screen. The default value for this parameter is 10000000 (10 MB).</p> <p>PLEASE NOTE: This setting also applies to Trace files (if enabled). For further information about the Trace file facility, please see section A.1.</p>



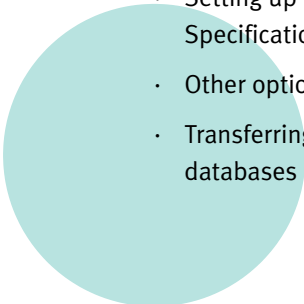


## Chapter 3

### Setting up Replicator for Microsoft Dynamics NAV

In this chapter we will discuss how to set up Replicator for use with MS Dynamics NAV.

This chapter contain subjects such as:

- Setting up Replicator (in general).
  - The Replicator Setup facility.
  - The databases facility.
  - Setting up transfers of data using Specifications.
  - Other options when setting up Specifications.
  - Transferring the design of MS Dynamics NAV databases into the setup database.
- 

## 3.1 SETTING UP REPLICATOR (IN GENERAL)

After having Replicator and the Replicator Setup Application installed you are ready to set up Replicator.

To transfer data between the databases Replicator needs to know how it can access the databases. This is done by creating a database record for each database that you want to transfer data to/from.

In addition, you have to create Specifications. Specifications are in essence the heart of Replicator. Here you specify exactly what Replicator should do, and how to do it. You make one Specification for each table you want to transfer data to/from.

Replicator also offers groupings of Specifications. Using Groups you can tie a given number of Specifications together and then have Replicator work only on the Group you specify in the Command Center or on the command line prompt. The Group facility will be covered in chapter four.

If the design of the tables you transfer data between are different from the setup database you have to transfer the design into the setup database (where you create the needed Specifications).

To actually transfer the data, you need to run Replicator (see chapter 6).

Below you see an outline of what to do:

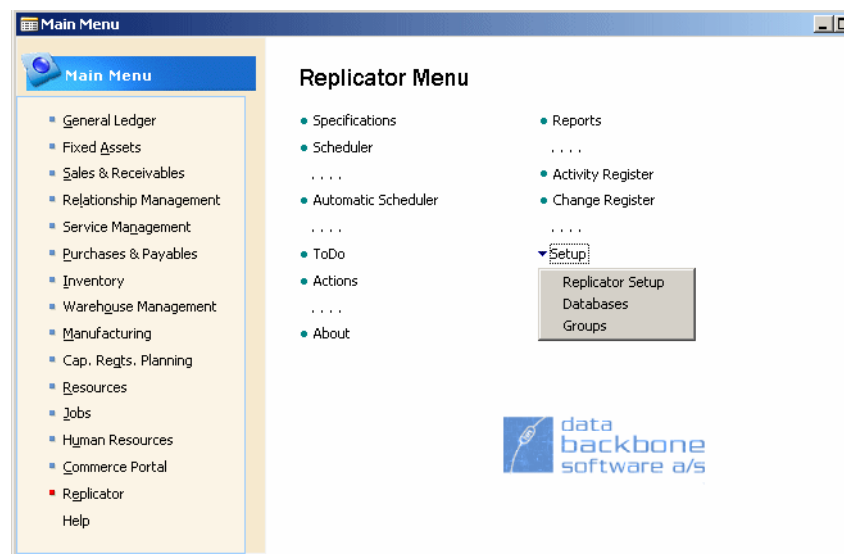
- Specify a number series in the field Specification Nos. (i.e., in Replicator Setup, the tab “Numbering”).
- Set up databases.
- Create Specifications.
- Run Replicator.

## The Setup menu

The Setup menu contains different setup facilities:

- **Replicator Setup:**  
Here you can specify different settings for Replicator such as specifying the Specification Nos. (defining what kind of numbering your Specifications should go by). You can also specify settings for the Navision Scheduler and the Replicator Scheduler.
- **Databases:**  
Here you set up the database records needed.
- **Groups:**  
Here you can create the groups needed (see section 4.1).

In the following sections we will cover the Replicator Setup and databases facilities.



The Setup menu resides in the Replicator main menu.

### 3.2 THE REPLICATOR SETUP FACILITY

In this facility you get the option of selecting between the tabs General, Numbering, Navision Scheduler and Replicator Scheduler.

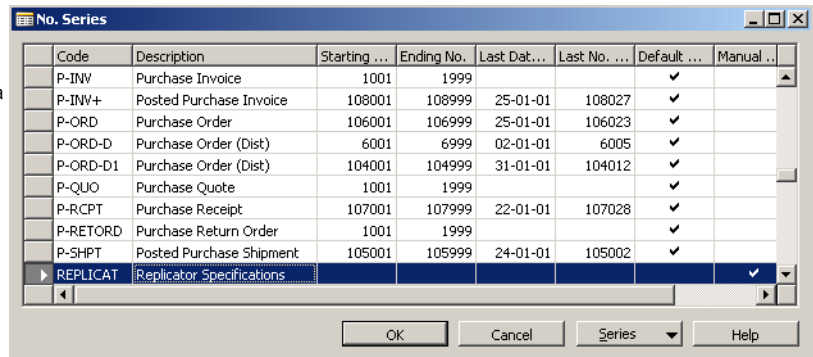
#### Numbering

Before creating any Specifications, you have to define what kind of numbering they should go by.

- 1 Select the tab “Numbering” and press F6. Now you have the possibility of creating a new number series code.
- 2 When you have created the code, you have to select it within the field Specification Nos.

**EXAMPLE**

If Specifications should be numbered automatically, you fill in a value within “Starting.” and mark “Default Nos.”. If Specifications should be numbered manually, you mark only “Manual Nos.”.

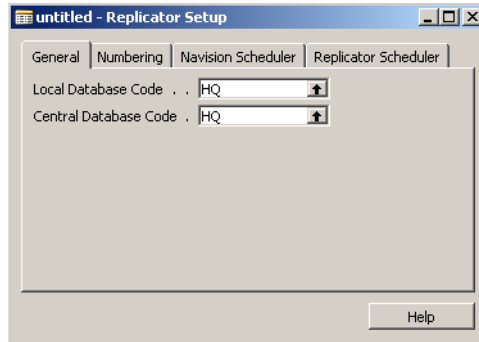


In the example picture we have created the new code, “REPLICAT” specifying that our Specifications should be numbered manually.

The field Scheduler Nos. must be specified if you want to create Scheduler jobs in the Scheduler. You have to create what kind of numbering your Scheduler jobs should go by (see section 4.12 for further information about the Scheduler).

## General

When you have set up the databases, you can specify the two fields in the tab “General”. The fields are used to indicate where the central database is located and where the local database is located.



### EXAMPLE

At HQ (Headquarters) the window General has been specified as in the picture above. Now you can quickly survey where you are compared to the central database.

Field Name	Field Description
Local Database Code	Here you have the possibility to fill in the database code of what location your local database is.
Central Database Code	Here you fill in the database code of the headquarters.

### Notice that...

.....

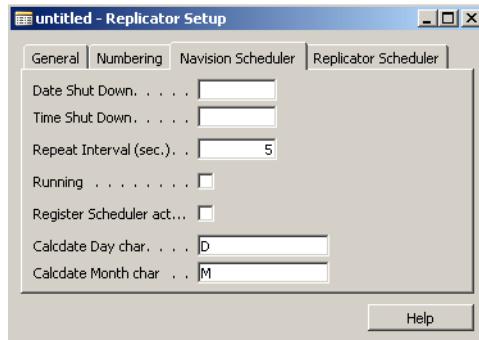
The fields “Local Database Code” and “Central Database Code” are not used by Replicator.

We included the fields here, because they are normally needed when you implement Replicator in a customer project. When the fields are specified correctly, you can easily determine (from your C/AL code) in which database you currently are running the code. For example, if “Local Database Code” <> “Central Database Code” we are in a local/department/salesman database. If “Local Database Code” = “Central Database Code” we are in the central database.

.....

## Navision Scheduler

Within the Navision Scheduler window you can specify the settings for the Automatic Scheduler (Scheduler jobs of the type MS Dynamics NAV).



The fields of the Navision Scheduler window are as follows:

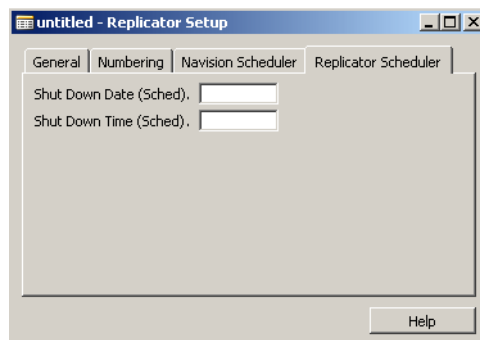
Fieldname	Field Description
Date Shut Down	Here you can specify what date the Automatic Scheduler should be shut down.
Time Shut Down	Here you can specify what time the Automatic Scheduler should be shut down.
Repeat Interval (sec.)	Here you specify the interval for how often the Navision Scheduler should check for Navision Scheduler entries (default is "5" seconds).
Running	If this field is marked it is an indication of that the Navision Scheduler is running.
Register Scheduler actions	By marking this field you can register Navision Scheduler actions in the Activity Register.
Calcdte Day char	By default this field is set to "D" meaning "Day". Depending on which version of MS Dynamics NAV you use you can use another term for day by typing the character defining the language you want to use. It should correspond to the parameters needed for the AL-function CalcDate. For example, if you have a German version of MS Dynamics NAV the german term would be "T" meaning "Tag".

Fieldname	Field Description
Calcdate Month char	By default this field is set to “M” meaning “Month”. Depending on which version of MS Dynamics NAV you use you can use another term for month by typing the character defining the language you want to use. It should correspond to the parameters needed for the AL-function CalcDate.

For more information about Scheduler jobs of the type Navision, see section 4.12.

## Replicator Scheduler

Within the Replicator Scheduler window you can specify settings for the Scheduler concerning Replicator jobs.



The fields of the Replicator Scheduler window are as follows:

Field Name	Field Description
Shut Down Date (Sched)	Here you can specify what date the Scheduler concerning Replicator jobs should be shut down.
Shut Down Time (Sched)	Here you can specify what time the Scheduler concerning Replicator jobs should be shut down.

For more information about Scheduler jobs of the type Replicator, see section 4.12.

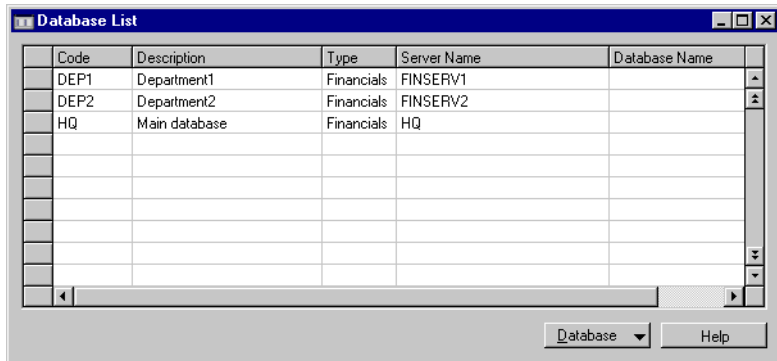
### 3.3 THE DATABASES FACILITY

Before you can transfer data between databases, you need to specify how Replicator can access these databases.

From version 3.00 of Replicator it is possible to transfer to/from an MS Dynamics NAV database hosted by an MS-SQL Server. An example of how to set up a database of this type will be shown later in this section.

The following steps describes how to set up databases within the Replicator Setup Application.

- 1 Select Setup from the Replicator main menu.
- 2 Choose Databases.
- 3 You enter the Database List window. Here all the database records that you have created will be listed.  
You can create the database records from here, however, you need to enter the Database Card in order to specify other things such as Company name.

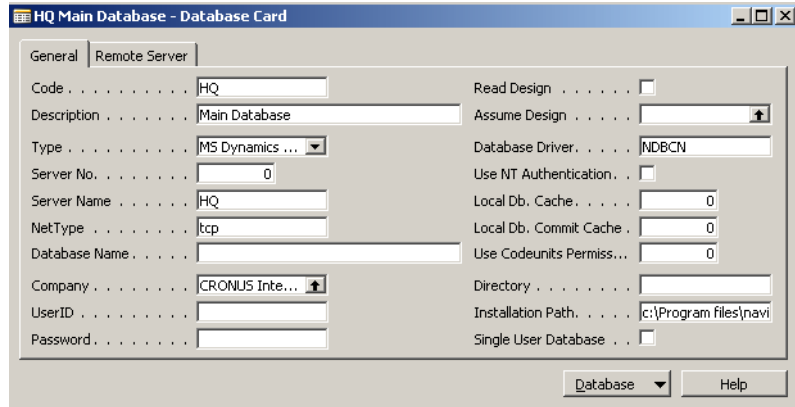


- 4 To enter the Database Card you can use SHIFT+F5 or press the button, Database, in the bottom of the window and choose Card.
- 5 Here you can use F3 to create a new database record or PageUp and PageDown.



The fields of the Database Card are described as follows:

**The tab, General**



Fieldname	What to fill in with...
Code	In the field Code, you give the database a name (unique ID).
Description	Fill in a descriptive text for the database. This field is for information only and is not used by Replicator.
Type	Here you specify, if the database is a Navision 3.56 or an MS Dynamics NAV database.
Server No.	If the database is hosted by a Navision 3.56 server, the servernumber is specified here.
Server Name	If the database is on an MS Dynamics NAV server or on an MS-SQL Server, you specify the name of the server here.
NetType	If the database is hosted by a server, you specify the network protocol type here. Can be either TCP/IP (apply "tcp") or NetBIOS (apply "netb"). If nothing is entered, the default is NetBIOS. If the database is hosted by an MS-SQL Server, this parameter is specified differently. Please refer to the MS Dynamics NAV for MS-SQL Server on-line help.

Fieldname	What to fill in with...
Database Name	<p>If the database is hosted by an MS-SQL Server, you specify the name of the database here.</p> <p>If the database is a local database you leave the fields "ServerName" or "Server No." and "NetType" blank and specify the exact location of the database instead (path and name).</p>
Company	<p>Specify the name of the Company that should keep the Configuration data (the Specification etc.).</p> <p>PLEASE NOTE: Company name is case sensitive!</p>
UserID	<p>If the database is protected by UserID and Passwords, you specify a UserID here. Since Replicator only needs access to read and write to tables it is a good idea to create a specific UserID for Replicator and give it access to all tables, both read and write, but remove all access to forms and codeunits, this will render the UserID useless for all others, but Replicator.</p>
Password	<p>Apply the Password for the UserID here, if any.</p>
Read Design	<p>When setting up Specifications, you can make use of a built-in facility that lets you choose between the different tables, fields etc. (the design) of the database you want to replicate to/from.</p> <p>As default Replicator will automatically use the design of the database in which the Replicator Setup Application has been installed. If you want to replicate to/from a database that uses a different design, you can mark this field and then run Replicator with the command line parameter "repnt g=design". Hereby Replicator will transfer the design of the remote database into the Replicator Setup Application.</p> <p>When marking "Read Design" the field "Assume Design" will automatically be filled in too.</p>

Fieldname	What to fill in with...
Assume Design	<p>If the database is a remote database where it is hard to get updates of design, but you know that the design matches another database, you can tell the Replicator Setup Application to assume the design of that database here. This of course means that the field “Read Design” should not be marked.</p> <p>If “Assume Design” (and “Read Design”) is blank Replicator automatically uses the design of the database in which the Replicator Setup Application has been installed.</p>
Database Driver	<p>By default this field is set to NDBCN. Only if the database is hosted by an MS-SQL Server you set the field to NDBCS.</p>
Use NT Authentication	<p>If you use the same UserID and Password to access the database as for logging on to your Windows NT platform, you can set this parameter to “Yes”. If you do this then leave the parameters UserID and Password.</p> <p>PLEASE NOTE: “Use NT Authentication” is only valid from version 2.50 of Navision Financials.</p>
Local Db. Cache	<p>If the database is a local database you can specify a size for cache settings.</p>
Local Db. Commit Cache	<p>If the database is a local database you can specify a size for commit cache settings.</p>
Use Codeunits Permissions	<p>You can transfer data to write protected MS Dynamics NAV tables. The additional rights are setup in a codeunit (as permission for the codeunit) and the number of the codeunit must then be specified in here.</p> <p>PLEASE NOTE: “Use Codeunits Permissions” is only valid from version 2.60d of Navision Financials.</p>
Directory	<p>Replicator uses certain MS Dynamics NAV files to access the databases (see section 2.6). For each database being used, a directory containing these files is required. By filling in the field “Installation Path” the directories needed will be created automatically under the Replicator main directory. They will be called the same as what you specified in the field “Code”. If you want to name them differently you can specify it here.</p>

Fieldname	What to fill in with...
Installation Path	Specify the path to the main directory of your MS Dynamics NAV or Navision 3.56 installation. For further information see section 2.6.
Single user database	Use this field to mark all Database Specifications that points to Navision Databases that are only used by one user (Laptop databases etc.).

**The tab, Remote Server**

The tab, Remote Server, is used with the Replicator Server facility and will be covered in chapter 5.

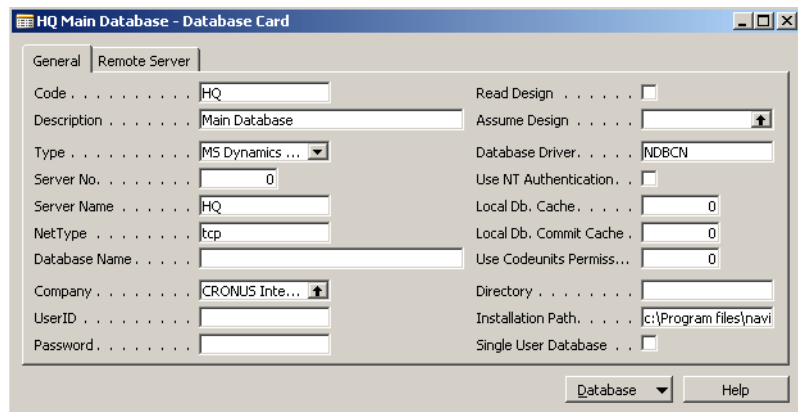
**Example**

To give you an idea of how to specify the fields, when setting up databases, we have made the following example.

**EXAMPLE, MS DYNAMICS NAV DATABASE ON AN MS DYNAMICS NAV SERVER:**

The database, which is running on the MS Dynamics NAV Server “HQ”, is accessed via the TCP/IP network protocol. The company is CRONUS International Ltd. and UserID and Password are not required. The main directory of the MS Dynamics NAV installation is: “c:\program files\MS Dynamics NAV”.

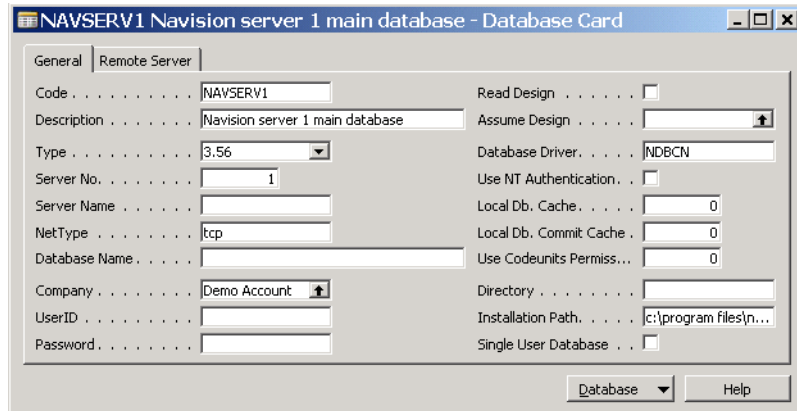
Based on the information given we create a database record the following way:



**EXAMPLE, NAVISION 3.56 DATABASE ON A NAVISION 3.56 SERVER:**

The number of the Navision 3.56 server is “1”. The Network Protocol is “Tcp” and the company is “Demo Account”. UserID and Password are not required. The main directory of the Navision 3.56 installation is “c:\program files\navision356”.

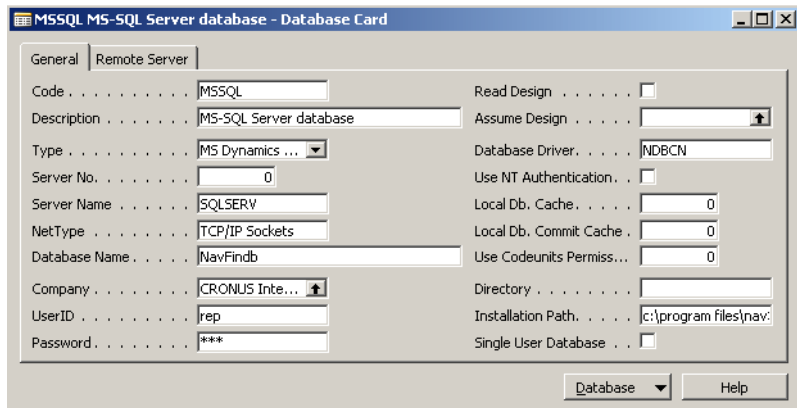
Based on the information given we create a database record the following way:



**EXAMPLE, MS DYNAMICS NAV DATABASE ON AN MS-SQL SERVER:**

The host name of the server is SQLSERV. The Network Protocol is “TCP/IP Sockets” and the company is CRONUS International Ltd. The name of the database is NavFindb, the UserID is “rep” and the Password is “rep”. The main directory of the MS Dynamics NAV installation is: “c:\program files\MS Dynamics NAV”.

Based on the information given we create the database record the following way:



**Notice that...**

.....

If the design of the database you want to transfer data to/from differs from the design of the setup database, you have to transfer the design of the database into the setup database. For this procedure see section 3.6.

.....

### 3.4 SETTING UP TRANSFERS OF DATA USING SPECIFICATIONS

To transfer data from one database to another, we need to specify what should be transferred and from where to where. In Replicator we operate with the following terms:

- **Source database:**  
The database or server where data is transferred from.
- **Destination database:**  
The database or server where data is transferred to.

The data from the source database will overwrite the data in the destination database.

For each transfer, you have to choose the source database and the destination database – i.e. where the data is read from and where it is written to.

If the design of the tables you transfer data between is different from the main database design, you have to transfer design into the setup database before setting up Specifications (see section 3.6).

Before setting up Specifications you must remember to specify what kind of numbering these Specifications should go by (see section 3.2, Numbering).

**Notice that...**

.....

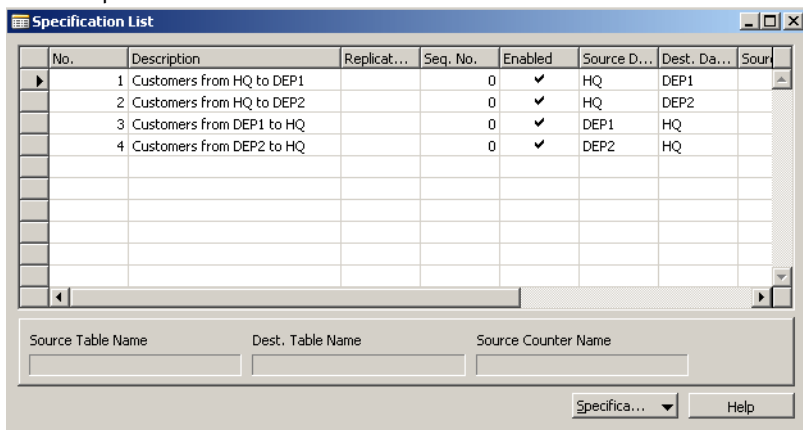
Setting up Specifications the wrong way can result in fatal data loss, so it is crucial to check Specifications more than once before running a transfer for the first time, and to test on demo data first.

.....

### Simple setup of transfer

The simplest type of transferring data, is a transfer of data from all fields in a table, to the same table in the destination database. This type of transfer is called All fields in the field Field List Type (see next page for field descriptions of the Specification List).

- 1 Select Specifications from the Replicator main menu.
- 2 This takes you to the window of the Specification List. Press F3 to create a new Specification.




#### EXAMPLE

As you can see, we have made an example showing the setup of four Specifications to transfer customer data between a headquarters (HQ) and departments (DEP1 & DEP2). This is a simple setup transferring entire tables and all records using Update-Add functionality.

The fields of the Specification List are as follows.

Field Name	Field Description
No.	Here you apply a number identifying the Specification (either manually or automatically depending on how you defined the Numbering). If you get a message that the Specification already exists but can not see it in the overview it might be because you have already used the number on a Sub Specification.



Field Name	Field Description
Description	A free text you can use to specify what this Specification is doing. The text is used in the Activity Register and is written on screen by Replicator.
Replicator Group Code	When you have created a group that you want a Specification to belong to this is where you choose the specific group. You can use F6 for lookup or press the lookup button  . For more information about groups see section 4.1.
Seq. No.	If you need to have the Specifications run in a specific order, you can specify the order here.
Enabled	If enabled is not marked, Replicator will ignore this Specification.
Source Database	The database where data is transferred from.
Dest. Database	The database where data is transferred to.
Source Table No.	The table that data is read from.
Dest. Table No.	The table that data is written to.
Transfer Type	Here you tell Replicator if the Specification is a Normal transfer, a transfer of the ToDo table, a transfer By Actions, a transfer of Objects, a Backup transfer, a BackupCompare, a CompanyExport or a CompanyImport transfer. For more information about the different types of transfers, please see chapter 4.

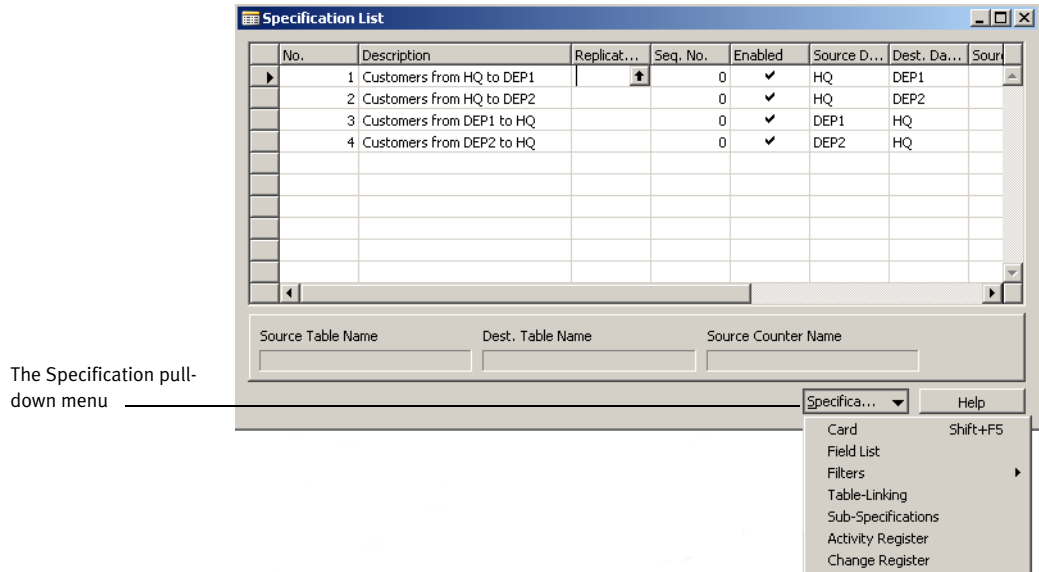
Field Name	Field Description
WhatToDo	<p>This field has several possible settings – all combinations of Update, Add and Delete.</p> <p><b>Update:</b> All records found in the destination database will be updated (overwritten) with the corresponding values from the source database.</p> <p><b>Add:</b> All records that are not found in the destination database, will be added to the destination database.</p> <p><b>Update-Add:</b> All records found in the destination database will be updated (overwritten) with the corresponding values from the source database. In addition, all records that are not found in the destination database, will be added to the destination database.</p> <p><b>Delete:</b> All records found in the destination database, that are not found in the source database, will be deleted from the destination database.</p> <p><b>Update-Delete:</b> All records found in the destination database will be updated (overwritten) with the corresponding values from the source database. In addition, all records found in the destination database, that are not found in the source database, will be deleted from the destination database.</p> <p><b>Add-Delete:</b> All records that are not found in the destination database, will be added to the destination database. In addition, all records found in the destination database, that are not found in the source database, will be deleted from the destination database.</p> <p><b>Update-Add-Delete:</b> All records that are not found in the destination database, will be added to the destination database. All records found in the destination database will be updated (overwritten) with the corresponding values from the source database. In addition, all records found in the destination database, that are not found in the source database, will be deleted from the destination database.</p>

Field Name	Field Description
Field List Type	<p>You can choose to replicate all fields or specific fields. If you want to transfer specific fields you enter the Field List in the "Specification" pull-down menu. You enter a window where you can specify a list of fields that should be either included or excluded. Included, means that only the fields that are specified in the Field List will be replicated. Excluded, means that all fields except those specified in the Field List will be replicated (see also section 3.5, Field List).</p>
Source Counter Field	<p>To use the Source Counter Field you need to create this field in the table you wish to replicate. This field must be of type BigInteger (see section 4.3). When the field is created you specify it here.</p>
Sub Specifications	<p>If this field is marked it indicates that the main Specification contain Sub Specifications.</p>

By filling in the fields in the Specification List window you have concluded the setup of a simple transfer.

### Complex setup of a transfer

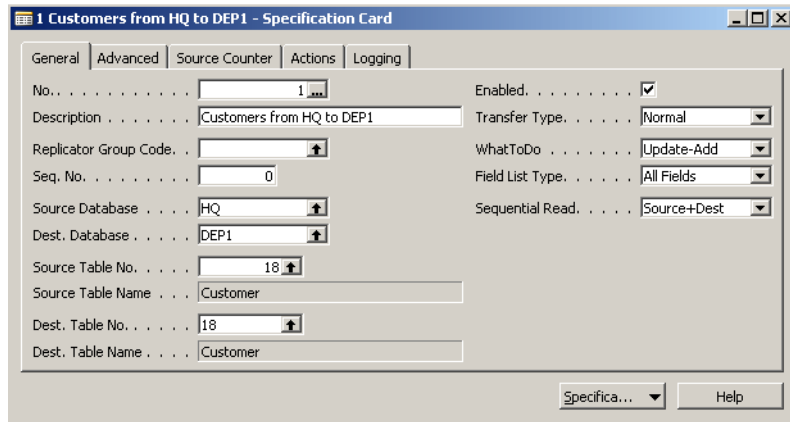
If you need to set up a more complex transfer you must enter the Specification Card. The Card is entered by pressing **SHIFT+F5** or by selecting Card in the Specification pull-down menu.



In the Specification Card you can fill in more detailed information. You can choose between the tabs: General, Advanced, Source Counter, Actions and Logging.

Source Counter, Actions and Logging (Change Register) will be covered in chapter 4.

General.



As you can see, most of the fields on the Specification List are repeated in the General window. So if you have set up simple transfers of Specifications you will be able to see what you specified in the Specification List here, as well.

An additional field not present in the Specification List window is the field, Sequential Read.

Field Name	Field Description
Sequential Read	<p>Here you can specify where Replicator should read the records from.</p> <p><b>Source only:</b> If you choose Source only, Replicator will read the records in the source database and then, look up these records' presence in the destination database.</p> <p><b>Dest only:</b> If you choose Dest. only, records are read in the destination database and looked up in the source database.</p> <p><b>Source+Dest:</b> If you choose Source+Dest, Replicator reads from both source and destination and then makes a comparison.</p>

**Advanced.**

Here you can specify Key Fields of source and destination and specify the Flag Field.

Following is a description of the fields in the Advanced window:

Field Name	Field Description
Source Design	If you have specified the field “Assume Design” within the database chosen as source, then what you specified there will automatically be inserted here. This also means that if “Assume Design” is blank, this field will be too.
Dest. Design	If you have specified the field “Assume Design” within the database chosen as destination, then what you specified there will automatically be inserted here. This also means that if “Assume Design” is blank, this field will be too.
Source Key Fields	This field shows the names of the fields in the key used. The primary key is used by default.
Dest Key Fields	This field shows the names of the fields in the key used. If using Source Counter, a key with the Source Counter field is used by default.
Source Flag Field	Here you can specify the number of the Flag Field. The Flag Field must be of type Boolean.
Source Flag Field Name	The name of the Flag Field is shown here.
Commit per	If you enter a number here the Replicator will Commit the destination (and Source Counter entries to the Log etc.) each time it has transferred this many records. The Replicator will continue until all records are transferred. This facility should be used together with Source Counter or Actions to ensure that all records will be dealt with. The facility is useful when using slow and unstable modem lines for communications. Commit Per can be used on all types of transfers except ToDo.
Buffer Size (Records)	If you use the Replicator Server facility, this field can be used. With this field you can control how many records are packed into one package before it is send to the Replicator Server. This allows you to fine tune the performance of the Replicator Server communication.

### 3.4 Setting up transfers of data using Specifications


<b>Field Name</b>	<b>Field Description</b>
Source Filter	If Source Filters have been set on the Specification this field will be marked.
Dest. Filter	If Destination Filters have been set on the Specification this field will be marked.
Sub Specifications	If this field is marked it is an indication of that the main Specification contains Sub Specifications.
Field List	If this field is marked it indicates that fields have been added to the Field List,
Table-Linking	If this field is marked it indicates that a table-link has been specified.

### 3.5 OTHER SETUP OPTIONS WITHIN SPECIFICATIONS


This section covers setting up more complicated transfers of data. Such as transferring only some of the fields in a table or data between different tables.

If you click on Specification (Specificat... pull-down menu) in the Specification Card you will get several options.

#### List

 If you select List, you enter the Specification List window.

#### FieldList

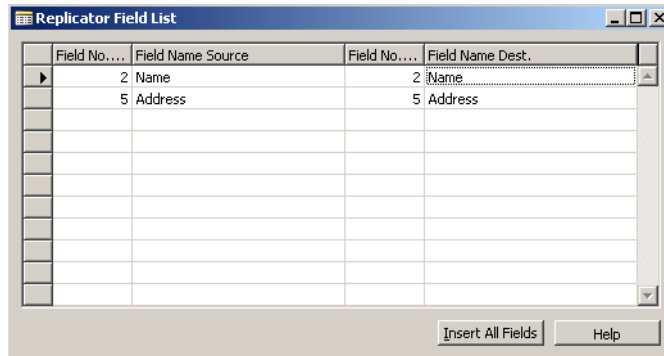
 If you select Field List, you enter a window where you can specify the correspondence between the source table and the destination table – i.e. which field in the source table is transferred to which field in the destination table.

Below, the fields of the Field List are described:

Field Name	Field Description
Field No. Source	Pressing F6 you can select the fields from the source table.
Field Name Source	The name of the source field will automatically be shown here.
Field No. Dest.	Here you select the corresponding fields in the destination table.
Field Name Dest.	The name of the destination field will automatically be shown here.



**EXAMPLE**

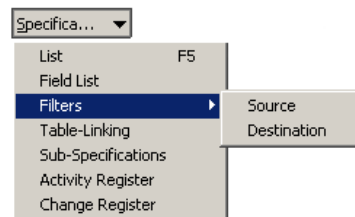


Above we have specified the Field List to include the two fields “Name” and “Address” of the customer Table. Completing this table tells Replicator that only these two fields will be transferred from the source to the destination database.

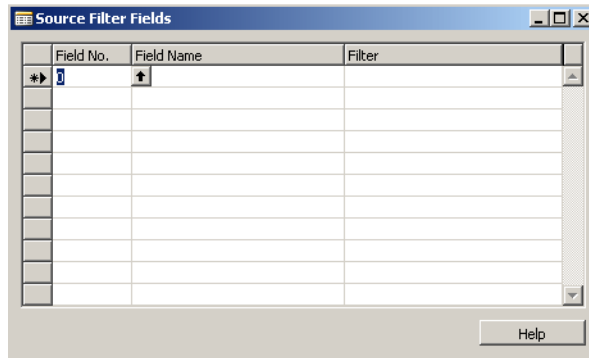
When specifying fields within the Field List, the Field List Type in the Specification Card will automatically change to Include, indicating that you have specified the fields to transfer – in contrast to transferring All Fields.

**Filters**

This feature is used for setting filters on either the source table or the destination table, so that only part of the table are read from or written to. When you select Filters in the pull-down menu, you first get a submenu where you can select either Source or Destination.



This submenu is used to set a filter on either the source table or on the destination table. Selecting either of the two you get a window where you can specify Filter Fields.



Below, the fields of the window Filter are described.

Field Name	Field Description
Field No.	Press F6 and you can select a Field No.
Field Name	The name of the field chosen will automatically be shown here.
Filter	Set a filter using the SETFILTER function. The filters set in this manner corresponds to setting a filter in C/AL using the SETFILTER function. When specifying a filter value for a Boolean field, Replicator supports that “1” or “0” is specified, which makes it easier to specify these filters in a Multi-language environment.

**Notice that...**

.....

If you are using Filters on the destination database you have to keep in mind that depending on how your Specification is set up you could get an error from Replicator. The error you are most likely to get is that a given record already exists, and Replicator will stop replicating. This is because Replicator is trying to add a record which is changed in the source database but the delimitation in the destination database is shielding the existing record in the destination database so Replicator is tricked into believing that it should add the record and not update it.

.....

**Table-Linking**

**Table-Linking** If the tables you transfer between differ so that the Primary key in the source table does not match the Primary key in the destination table you can use Table-Linking to link the source table to the destination table. You simply specify which field(s) in the source table makes up a unique key to be used to find records in the destination table (and to specify the corresponding fields in the destination table).

If you do not specify anything in this window, Replicator will use the fields making up the primary key in the source table. For example Replicator will use the customer number (field 1) when transferring the customer table (table 18).

Below, the fields of the window Table-Link Fields are described:

Field Name	Field Description
Field No.Source	Here you choose the number of the field in the source database that will be used as a key for linking it with the desired destination database. Press F6 and you can select a Field No. Source.
Field Name Source	The name of the source field will automatically be shown here.

Field Name	Field Description
Field No. Dest.	Here you select the field number in the destination database to be used for linking. Press F6 and you can select a Field No. Dest.
Field Name Dest.	The name of the destination field will automatically be shown here.

### Sub-Specifications

Selecting Sub-Specifications, you enter a window where you can create Sub-Specifications. Sub-Specifications can be used to link two related tables to one another or to group several Specifications together in a transfer where committing should not occur before all the Specifications have been transferred successfully.

Following is a description of the fields in the Sub-Specification List window.

Field Name	Field Description
No.	Give the Sub-Specification a unique ID (the name or number given cannot be the same as given to the main Specification).
Source Table No.	Here you select the source table.
Dest. Table No.	Here you select the destination table.
Description	Here you can describe the Sub-Specification.
Enabled	Leave the "Enabled" field marked. You may use this field to temporarily disable a Specification, if you do not want the transfer to be executed, but would like to keep the Specification for later use.

See section 4.5 for detailed discussion of Sub-Specifications and their uses.

## Activity Register

If you select Activity Register from the pull-down menu you enter the Activity Register window.

When entering the Activity Register this way, you will see only the entries belonging to the current Specification. If you want to survey all the Specifications which have been registered in the Activity Register, you will have to enter Activity Register from the main menu of Replicator.

When you run the Replicator program it will write some log information about the transfers to a register table in the setup database. The information in the Activity Register can be used to survey if any errors did occur when running Replicator. Every time Replicator gets an error it will be logged in the Activity Register, and marked as such. In the Activity Register you can see exactly what Replicator has been doing.

An example of the information that will be logged on to the Activity Register.

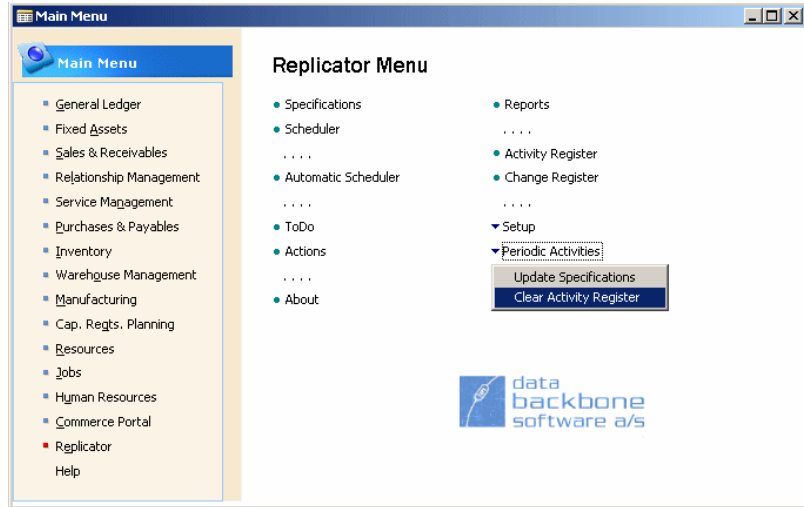
schedule...	Replicat...	Source D...	Dest. Da...	Date	Time	Error	Text
				05-03-07	14:55:42		Replicator for MBS Navision - ...
				05-03-07	14:55:42		Copyright (c) 1995,2007 Data...
				05-03-07	14:55:42		Version: 111 Servers + LogCh...
				05-03-07	14:55:42		Licensee: 5-45-06060399 - Ud...
		HQ	DEP1	05-03-07	14:55:42		Customers from HQ to DEP1
		HQ	DEP1	05-03-07	14:55:43		72 records read.
		HQ	DEP1	05-03-07	14:55:43		32 records checked and found...
		HQ	DEP1	05-03-07	14:55:43		15 records updated.
		HQ	DEP1	05-03-07	14:55:43		25 records added.
		HQ	DEP1	05-03-07	14:55:43		Time used on transfer: 00:00:00

Following is a description of the fields of the Activity Register.

Field Name	Field Description
Specification No.	This is the number of the Specification that generated this register entry. Any number given in this column, is for your information.
Scheduler No.	When the Replicator is running as Scheduler, the "Scheduler No." for the running scheduler card is shown here. This way you can see what is running and when it is running.
Replicator Group Code	If a group code is specified in the Specification it will be shown here.
Source Database	Here you can see what source database the register entry is replicated from.
Dest. Database	Here you can see what destination database the register entry is replicated to.
Date	Here you can see the date the register entry was generated.
Time	Here you can see the time the register entry was generated.
Error	If this register entry is part of an error message, this field is marked.
Text	The register text is seen here.
Source Counter	If the entry is a Source Counter entry, the Source Counter number will be shown on this column. In order to keep Source Counter functional, you must NOT DELETE THESE ENTRIES (see Source Counter, section 4.3).

Every time you run Replicator, information will be added to the Activity Register. That means, the size of it will continue growing.

You can reduce it by using the facility Clear Activity Register.



Doing this all entries up to a week ago will be cleared (the last Source Counter entry for a transfer will never be cleared).

The clear function is also available within the Activity Register (the button, Clear).

For more information on the special features in Specifications, see chapter 4.

**Notice that...**

.....

You can also view information about what happened during replication in the Replicator Log file (`replicat.log`). For further information, please see section 2.7.

.....

**Change Register**

**■** If you select Change Register from the pull-down menu you enter the Change Register window.

Please see section 4.9

### 3.6 READ DESIGN INTO THE REPLICATOR SETUP DATABASE

When setting up Specifications, you can make use of a built-in facility that lets you choose between the different tables, fields etc. (the design) of the database you want to replicate to/from.

As default Replicator will automatically use the design of the setup database. If you want to replicate to/from a database that uses a different design, you need to transfer the design of this database into the database where you set up and maintain Replicator.

To transfer the design of a database, you first need to set up databases as described in section 3.3. Then you can proceed with the following steps:

- 1 For each database you want to transfer design from, make sure that the Read Design field is marked in the Database Card.
- 2 Run Replicator with the command line parameter `G=Design (repnt g=design)`.

Hereby Replicator will read Design from all the databases specified (with the field Read Design marked).

For further information please refer to section 6.2

If you are having trouble in transferring the design when running Replicator with `G=Design` look up appendix A.2.



## Chapter 4

### Special facilities in Specifications

In this chapter we will describe the following special facilities available in Specifications.

- The Groups facility.
- The Flag Field.
- The Source Counter.
- The Actions facility.
- Sub Specifications.
- Tags.
- The ToDo table transfer facility.
- The Export and Import facilities.
- Change Register.
- Transfer of objects in MS Dynamics NAV.
- The Replicator Backup Server and BackupCompare facilities.
- The Scheduler.
- The CompanyImport and CompanyExport facilities.

## 4.1 THE GROUPS FACILITY

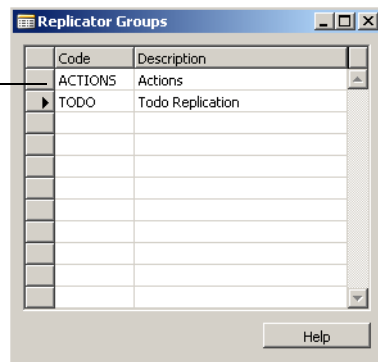
Using this facility you can group your Specifications.

First you create the group, then you enter the Specification that should belong to the group created and within the field “Replicator Group Code” the group is chosen.

There are two ways of creating groups:

- Select “Setup” in the Replicator main menu and then “Groups”. Now you can create the groups you need.
- Select “Specification” in the Replicator main menu. If you enter “Replicator Group Code” you can create groups and here choose the wanted group.

Example data showing two different creations of groups.



The fields of the Replicator Groups window are described as follows:

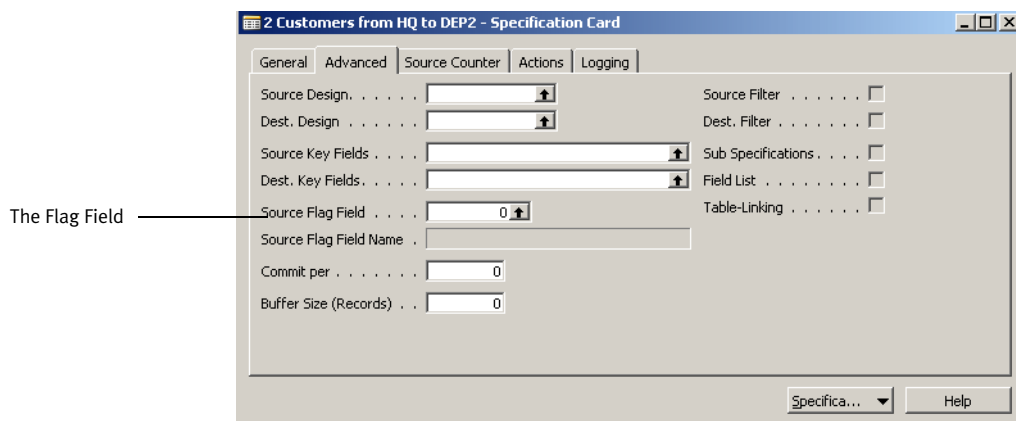
Field Name	Field Description
Code	Give the group a unique ID. PLEASE NOTE: The word “Design” is reserved by Replicator.
Description	Here you can enter anything you want.

## 4.2 THE FLAG FIELD

Replicator for Microsoft Dynamics NAV includes a useful feature – the Flag Field. This can be used to transfer only the records that have been changed since the last transfer (in order to reduce traffic) and to have an indication in the source database, that the changes were actually transferred to the destination database.

The Flag field facility is used when you know that the replication is going to be from one source to one destination.

The Flag field is, when created, specified in the Specification Card.



How to create the Flag Field is explained below in detail.

### How to create the Flag Field

The steps below refers to the customer table as an example:

- 1 Create a Yes/No field (boolean) in the customer table in both the source and the destination databases.  
This can be called, for example, "Transferred to Dest."
- 2 Add one line of code (C/AL) where customers are inserted and modified which will set this new Yes/No field to "No" each time a customer record is changed (indicating that this change in the record should be replicated in the next transfer).
- 3 Then, create a Specification where you set a filter on the Source table (the customer table, in this example) to take only records with "Transferred to Dest." = "No".
- 4 You can now run Replicator and only changed customer records (with "Transferred to Dest." = "No") are read and changes are written in the destination database. After the transfer, the "Transferred to Dest." field for these records are set to "Yes" in both the source and the destination databases.

**Notice that...**

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You should run only Update-Add for this kind of transfer!

.....

## 4.3 THE SOURCE COUNTER

The Source Counter is another easy way to handle replication of only changed data. This facility is used when you need to replicate to/from many destinations.

The Source Counter also has the advance (over the Flag Field facility) that the Source Records are Not modified during the data transfer.

We Generally recommend that you use the Source Counter facility if you want to transfer only the records modified or added since last Replication.

### The Source Counter is handled the following way

If you want to be able to transfer only changed data to/from a specific table using Source Counter, you need to create a Source Counter field in the table and add some code that will control the Source Counter so that each time a record is modified or inserted it is assigned the next Source Counter number (the Code will be described later).

#### EXAMPLE

We have just created a Source Counter in the customer table in our main database and therefore all records have their Source Counter set to "0".

Now we insert a new customer. That means, the Source Counter field on this record will now have Source Counter=1. Next we modify customer 1000. That means, this record will now have Source Counter=2. The next modification or insert will get Source Counter number 3 etc.

When you have created the Source Counter field and code, you enter the Specification transferring the table in question and here, under the tab "Source Counter" or within the Specification List, you specify the Source Counter field.

Now what happens when you run the Specification? Replicator will see that the Specification includes a Source Counter. So, it starts by looking in the Activity Register to see if the Specification has been run with a Source Counter before.

If the Specification has not been run with a Source Counter before, it will go to the table, where you created the Source Counter. Here Replicator will check if any records have Source Counter >0. If yes, it means that records have been inserted/modified since the Source Counter implementation. So, Replicator now transfers all the records where Source Counter >0. Then Replicator takes the highest Source Counter number used and stores it within the Activity Register. The next time you run the Specification Replicator will use this Source Counter number in order to know which records have been transferred and which records to transfer now.

**EXAMPLE**

Last time we replicated the customer table the Source Counter number within the Activity Register reached 10. Now we insert two new customers so they will within the customer table be assigned with the Source Counter numbers 11 and 12. If we replicate now, Replicator will go to the Activity Register and see that it should use the Source Counter number 10 as a filter. Then it refers to the customer table to see if any records have Source Counters >10. That means, Replicator will only transfer the two new records with Source Counter numbers 11 and 12. Then Replicator goes to the Activity Register and here it now stores the Source Counter number 12.

The Source Counter itself is not transferred to the destination database. This ensures that it will not interfere with a Source Counter that might be used in the destination database.

**Notice that...**

.....

When using Source Counter it is not possible to use "Delete" as part of WhatToDo. The reason for this is to prevent getting all non modified records in the destination database deleted. You can use Actions in order to delete data. Actions are described in section 4.4.

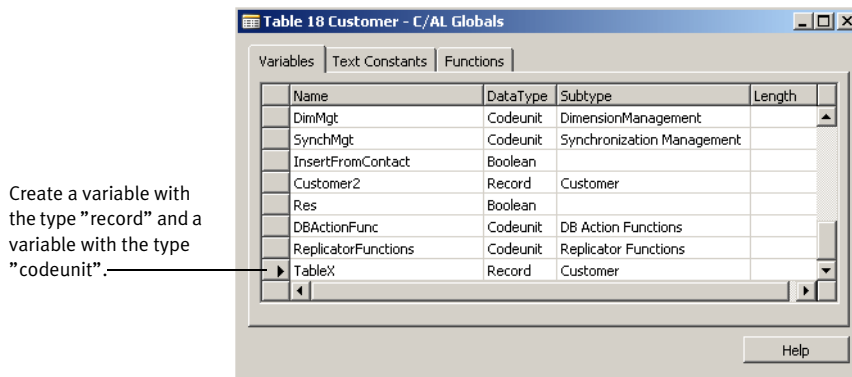
.....

It is also possible to use the Tag facility with the Source Counter. This enables you to have several source/destination combinations using the same Specification replicating only modified data.

## How to create the Source Counter

To create the Source Counter follow the steps below:

- 1 Create a field in the table you wish to replicate (for example, the customer table). This field must be of type BigInteger.
- 2 Create a key with the field.
- 3 Create the variables needed.



- 4 Add the needed Source Counter code (see code examples below the steps).
- 5 Add code where records are modified and inserted (see code examples below the steps).
- 6 If necessary, update the design in the setup database with `g=design`.
- 7 Specify the field number in the Source Counter Field in the Specification List or Specification Card under the tab, Source Counter.

## Source Counter Code

When creating the Source Counter, code (C/AL) is needed in the MS Dynamics NAV application that will update the Source Counter.

This C/AL code that will maintain the Source Counter, can be made in several different ways.

In MS Dynamics NAV 3.70 or later we can create the needed code in one central place and just have references or calls to the code from the places where records are actually modified. We have included a modified Codeunit 64825 Replicator Functions (see the ReplicatorFunctions\_370.fob file) with this central code.

Below we will go through the code as it should look, when using Navision version prior to 3.70 - in Appendix B we will have a full listing of the central code used in Navision 3.70 or later.

It is a good idea to read through the rest of this section to understand the Source Counter even if you are using MS Dynamics NAV 3.70 or later.

The code for updating the Source Counter should be placed on the field itself (Source Counter – OnValidate). By doing this, you can always call the update of the Source Counter with VALIDATE, and only have the code in one place. VALIDATE should be placed in the trigger code for OnInsert and OnModify. You should make sure that the INSERT and MODIFY code can be called at all times for a table.

When this is done, you have to locate all the places where the table is inserted/modified and then append a "TRUE" on the call to the insertion or modification. Doing this will tell MS Dynamics NAV to call the trigger code for the function call.

Following are examples of codes used when creating the Source Counter.



**EXAMPLES OF CODES****Code placed on the Source Counter field:**

```

IF TableX.SETCURRENTKEY(SourceCounter) THEN BEGIN
  IF NOT TableX.FIND(' + ') THEN
    SourceCounter :=
      ReplicatorFunctions.GetNextSCNumber(TableNoX)
  ELSE
    SourceCounter := TableX.SourceCounter + 1;
END;

```

Please note, that “TableX” is a record variable that should point to the table you implemented the Source Counter in. “TableNoX”, in the third line, is replaced with the number of the table you implemented the Source Counter in.

**Code on INSERT and MODIFY on the table:**

```
VALIDATE(SourceCounter);
```

All places where the Source Counter should be updated when a INSERT or MODIFY is performed, TRUE should be set as parameter:

```

TableX.INSERT(TRUE);
TableX.MODIFY(TRUE);
TableX.MODIFYALL(TRUE);

```

**Problems with Source Counter****Synchronization**

It is possible for the Source Counter in a database to get out of synchronization if a replication is run without the Source Counter being active. This can occur, for example, if you normally use a Source Counter on a given table, but then temporarily create a Specification that transfers all data. In this case you might see that the Source Counter will not work any more. You can get the Source Counter working again by deleting all the logs (in the Activity Register) regarding Source Counter on the Specification in question. Please note that this will make the first replication a lot slower than normal, since a lot more data has to be transferred. However, after the first replication the Source Counter will be working correctly again.

### Deleting Data

One special case that does pose a problem using the Source Counter (if you use the approach that we suggest for updating the Source Counter) is when a user deletes one or more records that hold the last numbers in the Source Counter.

Consider the following:

- A replication takes place ending with Source Counter 100.
- User now delete the records having the number 99 and 100.

The next two inserts or modifications will get the numbers 99 and 100. Since Replicator has already replicated numbers 99 and 100, and remembered this, it will not replicate these changes. You can avoid this problem by adding some code when deleting, that checks, that the record you delete is not the one with the highest Source Counter.

**Code used on DELETE for a Source Counter to check if it will break the Source Counter logic:**

```
IF TableX.SETCURRENTKEY(SourceCounter) THEN BEGIN
  Res := TableX.FIND ('+');
  IF ((TableX.SourceCounter <> 0) AND
    (TableX.SourceCounter = SourceCounter)) THEN BEGIN
    IF TableX.FIND('><') THEN BEGIN
      TableX.SourceCounter := SourceCounter;
      TableX.MODIFY();
    END ELSE BEGIN
      // Write last Source Counter into "Last
      // SourceCounter Numbers" table.
      ReplicatorFunctions.UpdateLastSCNumber(TableNoX,
        SourceCounter);
    END;
  END;
END;
```

Please note, that “TableX” is a record variable that should point to the table you implemented the Source Counter in. “TableNoX” in the eleventh line, is replaced with the number of the table you implemented the Source Counter in.

## Star Replication

The Replicator supports Star Replication. This facility makes it possible for Replicator to distribute changes made in one database to all other databases that replicate with the central database.

To enter the window in which you can set up Star Replication select Specifications in the Replicator main menu, select the Specification Card and the tab “Source Counter”.

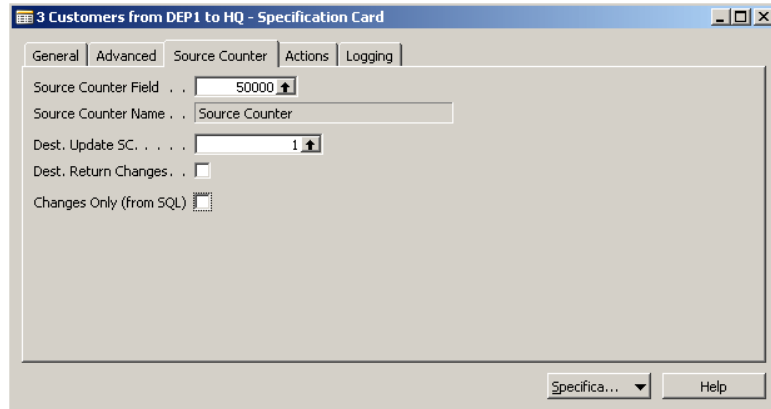
Following is an example of how to use Star Replication.

### EXAMPLE

In section 3.4 we created Specifications transferring customer data between a headquarters (HQ) and two departments (DEP1 and DEP2). Now we want to replicate only changed customer data by using the Source Counter. However, when replicating changed data from DEP1 to HQ we want to ensure that DEP2 also gets these changes. This can be done by activating Star Replication.

So we enter the Specification replicating customers from DEP1 to HQ and select the tab “Source Counter” (here we have also specified the Source Counter field that we have created). We enter the field Dest. Update SC. and here we choose Specification number 1 (replicating customers from HQ to DEP1). What now happens is that when changed data is replicated from DEP1 to HQ the Source Counter number within HQ will also be updated. That means that the changes made in DEP1 will be forwarded to DEP2 via HQ. The Source Counter number for the Specification replicating between DEP1 and HQ will also be updated within the Activity Register. That means the changes will only be sent to DEP2 and not back to DEP1.

Nevertheless, it might be necessary for you to have the changes returned to DEP1 because in the meantime there might have been changes made in HQ which DEP1 needs. The only way to ensure that DEP1 gets these changes is by marking the field Dest. Return Changes.



Following a description of the fields of the Source Counter window in Specifications:

Field Name	Field Description
Source Counter Field	When you have created the Source Counter you can fill in the field number here (it is possible to use F6 and choose the field from a list).
Source Counter Name	The name of the Source Counter field will be shown here.
Dest. Update SC.	Used to activate Star Replication (see previous example).
Dest. Return Changes	When the source database replicates to the destination database, the changes made in the destination database will be returned to the source database the next time the source database replicates. Mark this field if you want this to happen.
Changes Only (from SQL)	See description below

### Changes Only (from SQL)

This facility will allow you to transfer only the records that have been changed since last replication, but without having to implement any C/AL code or add any fields in MS Dynamics NAV. This facility work in the same way as the existing “Source Counter” facility, but without the need to add an extra field and code to the table in question.

The facility requires that the Source database is MS Dynamics NAV on SQL Server or MS Dynamics NAV on MS SQL Express (the SQL single user database).

When the field “Changes Only (from SQL)” is enabled, the Replicator will work in SourceCounter mode and it will use a timestamp field in SQL to retrieve only the records changed since last replication. The highest transferred timestamp will be saved in the Activity Register, just as with the normal Source Counter facility.

As with the existing “Source Counter” facility, only Inserts and Modifications can be detected with the “Changes Only” facility. Deletions of records can be handled by the “Actions” facility.

This facility is also supported by the Replicator Server, so that the Source Database used can be accessed via the Replicator Server. The Replicator Server will handle the Reading of data in an optimized way and only deliver the records back that have been changed since last replication.

**Notice that...**

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This facility requires MS Dynamics NAV 3.70 or later (as Source Database).  
This facility is available in version 4.21 or later of the Replicator.

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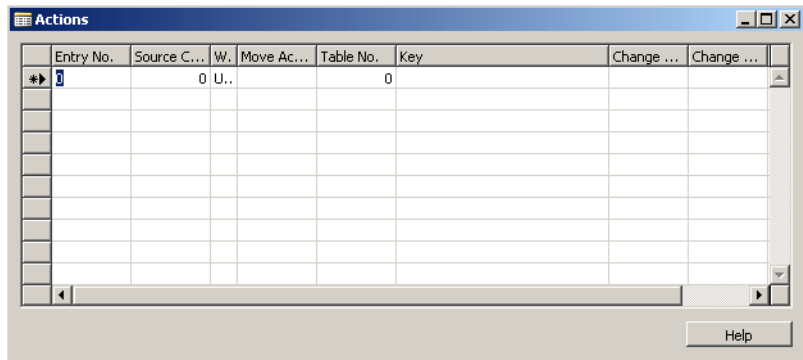
### 4.4 THE ACTIONS FACILITY

The Actions facility is what you can view as a Dictation Machine in Replicator. In this “Dictation Machine” you specify exactly what it is you want Replicator to do with data. You can tell Replicator which table and which record (by specifying the primary key values) it should either Update, Add or Delete. We suggest you to use Actions to handle transfers of deletions; Especially if code (C/AL) is **not** needed to verify a deletion. If code (C/AL) is needed to verify a deletion, the ToDo table facility should be used (see section 4.7).

A standard Action table has been defined in Replicator (table 64832 Action) where you can specify the value of the primary key.

It is also possible to create several different Action tables as long as they follow a specific design.

To enter the standard Action table select Actions in the Replicator main menu.



The fields of the Action table window are as follows:

Field Name	Field Description
Entry No.	The sequential number of the Action.
Source Counter	This is the standard source counter in the Action table. If the source counter is "o" it is regarded as private and Replicator will not replicate it before a source counter is given to the record.
WhatToDo	Here you tell Replicator what should be done with the data. Either Update, Add, Delete or Update-Add.
Move Action	If this field is marked TRUE and the field "Move Actions" within the Specification processing the Action field is marked too, this Action entry will be copied to the destination database.
TableNo	Here you specify the number of the table the Action should be run on.
Key	The primary key values are placed here. If there are more than one field in the key, the values are separated with a '+'. A '*' can be put instead of a specific data value, meaning all data.
Change Date	This field is for the Application and is not used by Replicator.
Change Time	This field is for the Application and is not used by Replicator.
Changed by User	This field is for the Application and is not used by Replicator.

### Specifying the Key

When adding Actions it is important to specify which data the Action should work on. This is always done by specifying data matching the primary key of the table specified in the Table No. field.

If a key contains more than one field, you can specify the values separated with a '+' or with any separator sign (key-delimiter specified in the `replicat.ini` file (Replicator INI Editor) see section 2.7).

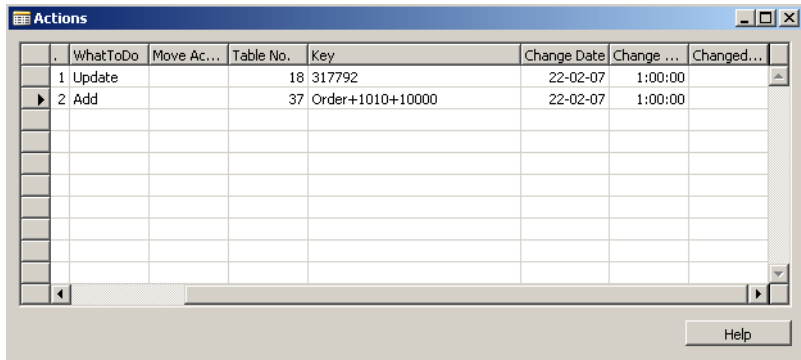
**Notice that...**

.....

You can use standard MS Dynamics NAV filters on the Key fields. In order to act on more than one record at a time you can also use wildcards (“\*”) on the Key fields.

You have to specify as many values as there are fields in the key!

.....



Following examples will refer to the table above.

**EXAMPLE 1**

On the customer table, the primary key consists of only one field; “Number” – so only values for this field should be filled in for the Key field.

What to replicate	Fill in this value for the Key field...
Customer 317792	317792
Customer 100 to 500:	100..500



**EXAMPLE2**

On the sales lines there are three fields in the primary key:  
DocumentType+DocumentNo+LineNo.

What to replicate	Fill in this value for the Key field...
Line 10.000 on order 1010	Order+1010+10.000
All lines on the above order	Order+1010+*
All lines on orders 1000 to 2000	Order+1000..2000+*
All orders:	Order+*+*

**Action functions**

The codeunit "Replicator Functions" contains functions that you can make use of in order to get Action entries added to the Action table automatically. These can, for example, be called on the triggers OnInsert, OnModify and/or OnDelete in the table that you want Actions performed on so that each time a record is either updated, added or deleted an Action entry will be added to the Actions table referring to that record.

The functions are as follows:

- ActionAdd:  
`ReplicatorFunctions.ActionAdd(TableNo, Key);`
- ActionUpdate:  
`ReplicatorFunctions.ActionUpdate(TableNo, Key);`
- ActionDelete:  
`ReplicatorFunctions.ActionDelete(TableNo, Key);`
- ActionUpdateAdd:  
`ReplicatorFunctions.ActionUpdateAdd(TableNo, Key);`

**EXAMPLE, Action of Deletions**

If you want to transfer deletions using Actions you add the trigger code calling the codeunit "Replicator Functions". You place the code on the delete trigger in the table requested. This act of deletion will be added to the Action table. Then all you have to do is to set up a Specification transferring the Action table.

Following is an example of the code for deletion referring to the customer table (see the Advanced Example in chapter 8 for more information).

```
ReplicatorFunctions.ActionDelete(18, "No.");
```

**Notice that...**

.....

If you are using MS Dynamics NAV version 3.70 or later, the code needed to create Actions can be placed in a central place. We have included an updated version of the Codeunit 64825 Replicator Functions (import the ReplicationFunctions\_370.fob file) with this central code. Please see Appendix B for more information.

.....

**EXAMPLE, Action at Deletion with MS Dynamics NAV 3.70**

In the Customer Table Trigger code, we create two new variables:

```
CustRef type RecordRef
ReplicatorFunctions type Codeunit Replicator Functions
```

The code in the OnDelete trigger should look like this:

```
CustRef.GETTABLE(Rec);
ReplicatorFunctions.OnDelete(CustRef);
```

**Setting up Specifications with Actions**

**■** In order to execute the Actions present within the Action table you first need to set up a Specification where you specify the following:

- 1 Choose the Source Database where Replicator should read Actions from (e.g HQ).

- 2 Choose the Destination Database where the Actions should be carried out (e.g. DEP1).
- 3 Set Transfer Type to By Actions.

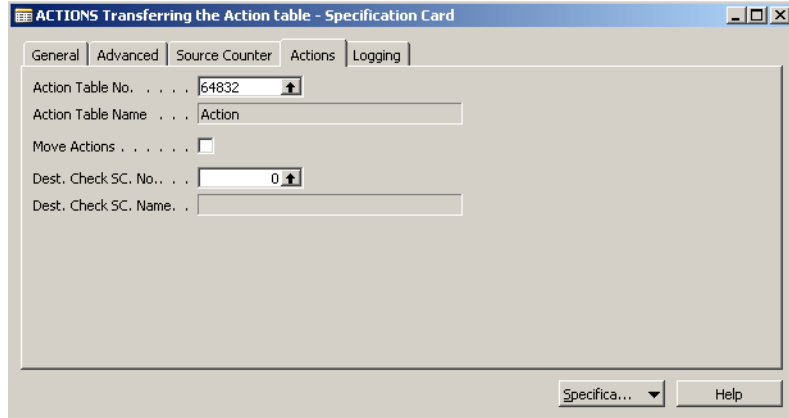
The screenshot shows a dialog box titled "ACTIONS Transferring the Action table - Specification Card". It has several tabs: "General", "Advanced", "Source Counter", "Actions", and "Logging". The "General" tab is selected. The fields are as follows:

No. . . . .	ACTIONS	Enabled. . . . .	<input checked="" type="checkbox"/>
Description . . . . .	Transferring the Action table	Transfer Type. . . . .	By Actions
Replicator Group Code. . .		WhatToDo . . . . .	Update-Add
Seq. No. . . . .	0	Field List Type. . . . .	All Fields
Source Database . . . . .	HQ	Sequential Read. . . . .	Source+Dest
Dest. Database . . . . .	DEP1		
Source Table No. . . . .	0		
Source Table Name . . . . .			
Dest. Table No. . . . .	0		
Dest. Table Name . . . . .			

At the bottom right, there are buttons for "Specifica..." and "Help".

Replicator will then automatically select the standard Action table “64832” and select the standard Source Counter.

If you have created an Action table yourself, or have created special Source Counters on the Action table, you should tell Replicator to use that table or Source Counter by specifying it in Source Table No and Source Counter Field respectively in the Specification. You can choose the Action table you created yourself on the tab “Actions” under the Specification Card.



Following is an explanation of the fields in the Actions window in Specifications:

Field Name	Field Description
Action Table No.	When you set the "Transfer Type" to "By Actions" the number of the default Action table will automatically be selected here.
Action Table Name	Here the name of the Action table will be shown.
Move Action	If you want to move the Action entries present within the Actions table to the destination database you mark this field plus the entries (in the Actions table) you want to move.
Dest. Check SC. No.	If you are using Actions in order to delete data and your destination database contains a Source Counter, you can by specifying the destination' s Source Counter field here set Replicator to check that it does not delete the record with the largest Source Counter number in the destination table (if it did, it would break the SourceCounter logic in the destination table). You can specify the Source Counter number manually without using the lookup facility.
Dest.Check SC. Name	The name of the destination Source Counter.

## 4.5 SUB SPECIFICATIONS

Sub Specifications can be used when you have a main table that has other tables linked to it.

A Sub Specification works exactly as the main Specification except for the following:

- The changes made by a Sub Specification are not committed before the main Specification.
- It is not possible to attach Sub Specifications to a Sub Specification.
- You are able to set up a link between Sub Specifications and a main Specification.

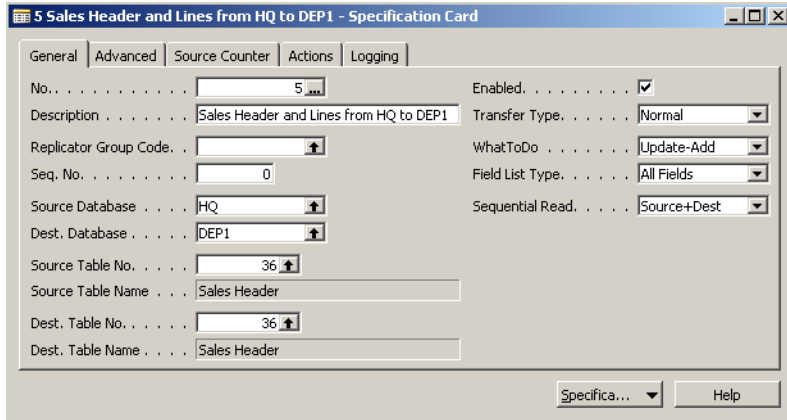
One use of Sub Specifications is to link related tables to each other, for example, Sales Header and Sales Lines; so that, each time a header is added, the lines are also processed. When setting up such a relationship you specify the link between the tables in the Sub-Specifications Link window.

Another use of Sub Specifications is to group several Specifications together so that the committing data takes place only after all Specifications have been processed and transferred successfully. When doing this you do not need to specify a link. In early versions of Replicator you would get an error if no link was present between a Specification and a Sub Specification. If you get this error please update Replicator to version 1.60 or later.

Following is how to set up Sub Specifications referring to the example of Sales Header and Sales Lines:

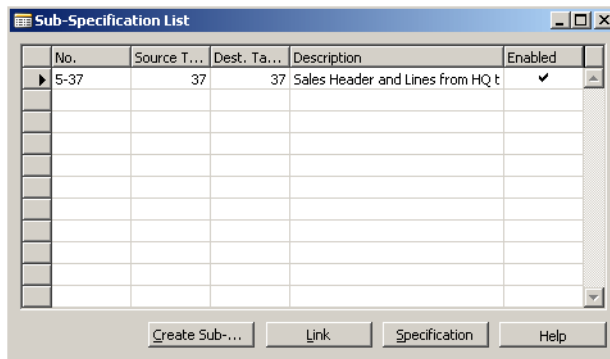
- 1 Create a Specification that will replicate the Sales Header from one database to another.

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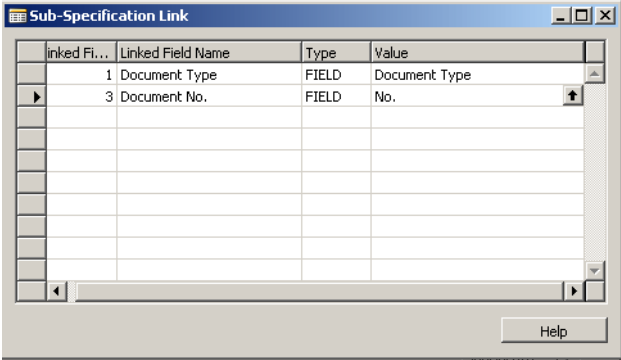


2 When this is done you select Sub-Specifications in the Specification pull-down menu.

Here you create the Sub Specification and fill in the table number of the Sales Lines. Please refer to section 3.5, Sub-Specifications, for a description of the fields of Sub-Specification List window, in general.



3 Having done that, select Link. Here you specify your link the same way as it is normally done in the MS Dynamics NAV development environment.



**Notice that...**

.....

If using Sub Specifications on a Specification with a Source Counter, remember to update the main table with the Source Counter so that the changes to the Sub Specification are replicated. The reason for this is that Replicator only looks at Sub Specifications when the main Specification is processed.

That means, if you make changes to data in a table that is a Sub Specification, it is necessary that the record it belongs to on the main Specification is also changed so that Replicator will transfer the data. If this is not done, changed data on the tables in Sub Specifications are only replicated the next time the main record is changed.

.....

It is advisable to select a key on the Sub Specification that is matching the link you have specified. If this is not done, it might have an impact on the performance when Replicator is going through the records in the Sub Specification.

.....





**EXAMPLE**

If you would like to replicate from HQ (one source) to DEP1 and DEP2 (several destinations) you can define this by setting Tags in the Specifications. You can for example specify the Dest. Database field with "%1". After defining this you call Replicator with:

```
repnt 1=dep1
```

and then with:

```
repnt 1=dep2
```

Replicator then replicates data from HQ to DEP1 and DEP2 using the Tag %1 defining the destinations.

**Notice that...**

.....


If running the Specifications from the Command Center the Tags can be specified here (see the Command Center Guide).

.....

## 4.7 THE ToDo TABLE TRANSFER FACILITY

Replicator for Microsoft Dynamics NAV comes with a special table called the ToDo table. This table can be used to make a mailing system between different MS Dynamics NAV databases. It can be used to send messages such as product price updates that should be distributed from one database to some selected other databases.

### ToDo in Specifications

 The ToDo table works together with Transfer Type in Specifications.

To set up such a Specification using ToDo, follow the steps below:

- 1 Ensure that the ToDo table object is read into all the databases that should use it.
- 2 Set up a Specification between the databases – one for each database – and set the Transfer Type to “ToDo Table”.

When selecting transfer of the ToDo Table from a source database to a destination database, records in the ToDo Table in both source and destination database will be exchanged (replicated) in both directions.

#### EXAMPLE

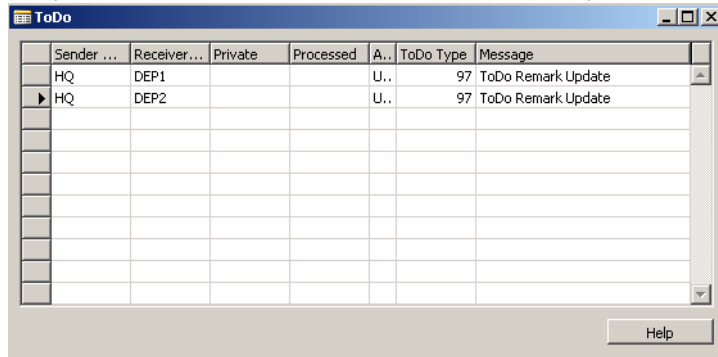
This could be illustrated with three databases (A, B and C) as follows where, database B is the central database and ToDo Specifications are set up from B->A and from B->C:

A < - (>) B (<) - > C

Database A wants to send a ToDo to database C but only have ToDo transfer set up with B. This record will then be sent to B. B will notice that the destination for this record is C and since it has a ToDo replication setup with C will forward the message from A.

## The ToDo table window

To open the ToDo table window, select ToDo in the Replicator main menu.



Above we have specified a transfer by using the ToDo window.

The fields in the ToDo table are as follows

Field Name	Field Description
Sender Database	This is the originator of the ToDo record.
Receiver Database	Here you apply who should receive the record.
Private	When marking this field, Replicator will ignore the ToDo record. This is especially useful if you need to gather a given number of records together and you are not sure if a replication will happen in-between the generations of the records.
Processed	When the receiver got the record and has done what should be done with it, it should mark the record as processed so the sender can either delete it or do what ever more is needed.
Action	Since one of the ways ToDo is used a lot, is to do actions on records, we have added this field to be used for flagging if the action should be Update, Add, Delete. It can be expanded by the programmer to reflect other types of actions.
ToDo Type	This is a free field that the programmer can use to tell the destination what kind of ToDo message this is.
Message	A free field that can be deleted by the programmer if it is not needed.

### The Private field

When parts of a replication solution is based on the fact that the ToDo record is being replicated fairly often, for example, every two minutes, it can come in handy to have a way to tell Replicator not to transfer some ToDo records before a certain time. This could be necessary if a batch job is running, creating ToDo records with statistical data, where it is absolutely necessary that all ToDo records are replicated at the same time. This batch job should then mark all the records as Private "Yes" until it is done processing and then clear the private flag. At this time Replicator will then transfer all the records in the same run.

### Creating fields in the ToDo table

The fields Sender Database, Receiver Database, Private, Processed, Action and ToDoType are required in the ToDo table.

Apart from this you can freely create your own fields but you must ensure that the layout of the ToDo tables are alike in all databases.

### When delete is part of ToDo

You have to take special care of Specifications where delete is part of ToDo, especially if you set up Filters on the source or destination. If you for example set up a Filter on the source database but forget to set the Filter on the destination, all records that Replicator can not find in both the source and destination will be deleted even if this was not intended when the Specification was set up. So check the Specifications to include delete an extra time before running Replicator.

## 4.8 THE EXPORT AND IMPORT FACILITIES

Replicator for Microsoft Dynamics NAV has built-in facilities to export/import the Setup Information specified within the Replicator Setup Application such as Database records, Groups, Scheduler jobs, all or part of Specifications to/from a file.

By using the Export and Import facilities you can, for example, move Specifications between two databases, for example, when testing the Specifications on a test server and then moving the tested Specifications to the production server.

### The Export facility:

If you want to export the Setup Information to a file, you simply apply the following on the command line prompt:

```
repnt e=<path and filename>
```

Replicator will write information about which tables have been exported both on screen as well as within the Activity Register.

```

Replicator Command Prompt
Microsoft Windows XP [version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.


C:\Programmer\Data Backbone Software\REPNT>repnt e=c:\replicat\export.dat
Replicator for MBS Navision - Release 4.21.17
Copyright (c) 1995,2007 Data Backbone Software A/S, All rights reserved.
Version: 1 Server + 1 Laptop + LogChanges + Objects + Server + ChangesOnlySQL +
NoActivatData Backbone Software A/S - expires 31-12-2007
Licensee: 5-45-07020422 - Data Backbone Software A/S - expires 31-12-2007
Exporting Specifications (Group '') to file 'c:\replicat\export.dat'.
Exported table 'Specification' - 9 records exported.
Exported table 'Field List' - 10 records exported.
Exported table 'Field Filter' - 0 records exported.
Exported table 'Linked Table Filter' - 2 records exported.
Exported table 'Database' - 3 records exported.
Exported table 'Replicator Group' - 5 records exported.
Exported table 'Scheduler' - 2 records exported.
Exported table 'Scheduler Tag' - 1 records exported.
Exported table 'Replicator Setup' - 1 records exported.
Total time used: 00:00:00

C:\Programmer\Data Backbone Software\REPNT>

```

When applying `repnt e=<path and filename>` Replicator will export all Specifications. If you only want to export a Group of Specifications you simply add `g=<group code>`.

**The Import facility:**

 If you want to import the Setup Information from an “export” file, you simply apply the following on the command line prompt:

```
repnt i=<path and filename>
```

Replicator will write information about which tables have been imported both on screen and within the Activity Register.

Using the above command Replicator will import all Specifications. If you only want to import a Group of Specifications you simply add the `g=<group code>` parameter.

If a Specification already exists in the database, the import will write a warning, but still continue the import.

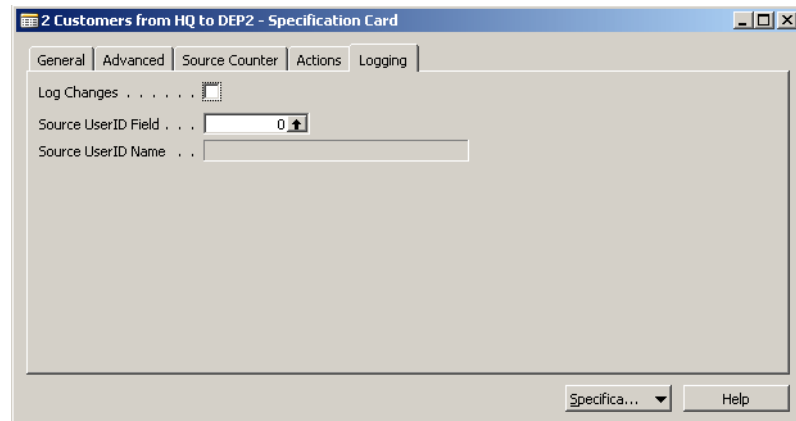
**Notice that...**

.....  
If importing Navision 3.56 Specifications into MS Dynamics NAV, you have to also choose Periodic Activities within the Replicator main menu and press Update Specifications. This is needed due to a slight difference in the layout of the applications between Navision 3.56 and MS Dynamics NAV.  
.....

## 4.9 CHANGE REGISTER

Starting with version 1.52, it is now possible to log changes that occur to data while replicating.

Enter the Specification Card window and choose the tab “Logging”.



The fields of Logging are described below:

Field Name	Field Description
Log Changes	<p>If you mark this field, Replicator will log changes to the Change Register.</p> <p>Default 10000 changed records are cached at a time. The cache size can be adjusted in the Replicat.ini file with the line:</p> <p>Changes Log max cache: &lt;number of records&gt;</p> <p>When running as a Service through the Replicator Service Manager, default 10000 records is the only opportunity.</p>
Source UserID Field	<p>If the table specified on the Specification has a UserID field showing who changed the data, you can specify the field number of that field here. Then Replicator will write who changed the data in the Change Register.</p>
Source UserID Name	<p>This field only shows the name of the field specified in Source UserID Field.</p>

## Change Register

You can enter the window of Change Register by selecting it from the Replicator main menu.

If you have marked Log Changes in Logging, the Change Register gives you an overview of all changes.

Change Register fields are as follows:

Field Name	Field Description
Date	What date the change occurred.
Time	What time the change occurred.
UserID	If a UserID field was specified on the Specification that logged the changes, the value of the UserID on that record is shown here.
Changes Made	What type of change has been made is seen here. It is either Update, Add or Delete (see next page).
Table No	What table number the change was made on.
Table Name	The name of the table.
Key Fields Value	This field contains the values of the primary key delimited by a '+' or whatever delimiter has been specified in the <code>replicat.ini</code> file (Replicator INI Editor).
Field No.	The field number the change is referring to.
Field Name	The name of the field in FieldNo.
Old Value	The old value of the field before it is updated.
New Value	The new value, which is written to the record, is shown.



## The Changes Made field

Below is a list of the effects of different types of changes made on the Change Register:

### Update

All fields that are updated on the given record will be logged with new and old value.

### Notice that...

.....  
 Only changed fields will be logged.  
 .....

### Add

When adding, all fields containing a value will be logged. Old value will be empty and new value will contain the data inserted. Empty fields are not shown as added.

### Delete

Only a notification that a record has been deleted is logged. No data values are shown. The TableNo. will show what table the deletion was done in, and the Key Fields Values field contains the primary key of the record deleted.

### Notice that...

.....  
 Logging Changes does require some additional database space. Databases can grow quite rapidly.  
 .....

## 4.10 TRANSFER OF OBJECTS IN MS DYNAMICS NAV

Replicator can replicate system objects (codeunits, tables, forms etc.) between MS Dynamics NAV databases.

**If you are using MS Dynamics 5.0 or earlier:**

In MS Dynamics NAV 5.0 or earlier there are some limitations in the way the C/Front library handles writing of these objects to the MS Dynamics NAV database. Meaning that there are some restrictions regarding changes to objects that can be replicated in the older versions of MS Dynamics NAV.

In general you can only transfer an update or create an object if your MS Dynamics NAV licence allows you to do the exact same changes that are introduced in this new or updated object. This means that if you are able to e.g. create a new field in a table, then this change can also be replicated to another database using your MS Dynamics NAV licence file. This also means that changes which only Microsoft is allowed to do - like adding a field to a standard table with a field number lower than 50000, cannot be replicated using a normal MS Dynamics NAV customer (or even dealer) licence.

**If you are using MS Dynamics NAV 5.0 SP1 or later:**

In C/Front for MS Dynamics NAV 5.0 SP1, Microsoft has introduced a new functionality that handles import and export of Objects in the same way as it is done in the MS Dynamics NAV Client. This means that if you are using MS Dynamics NAV 5.0 SP1 or later, all updated or new created objects can be transferred regardless of your MS Dynamics NAV licence!

**Notice that...**

.....

You do not have to upgrade the MS Dynamics NAV Application Objects to version 5.0 SP1 - you should be able to run for example a version 4.0 Application on the new version of the MS Dynamics NAV executables. However if you have any doubts about this, please consult you MS Dynamics NAV dealer regarding this

.....

### How to set up transfer of all Objects

■ To set up transfer of all Objects just follow the steps below:

- 1 Create a Specification.
- 2 Set Source and Destination database.
- 3 Set Transfer Type to Objects.
- 4 Run the Specification.

This is all that is needed to actually update design between databases.

#### Notice that...

.....  
The Replicator Setup Application default selects Update-Add as WhatToDo, but it is also possible to have delete if you wish to do so. When replication takes place Replicator does not actually compare all the codes to find out if an object needs to be updated, added or deleted. Instead, Replicator uses the Version list and the date + time, to compare objects with and from that decides if any action should be done on a given object.  
.....

### Transfer of specific types or range of Objects

■ If you need to transfer only specific types of Objects or only a specific number range, this is possible by applying filters to the Specification. You simply set up Filters on the version list or other available fields, delimiting what Objects should be transferred.

To set up transfer of only specific types of Objects just follow the steps below:

- 1 Create a Specification.
- 2 Set Source and Destination database.
- 3 Set Source Table No to 200000001.
- 4 Set Transfer Type to Objects.
- 5 Set the required Filter.
- 6 Run the Specification.

**Notice that...**

.....

If Delete is part of WhatToDo, please remember to also set Filters on the destination database if there are Filters set on the source database. If this is not done Objects in the destination database that can not be found within the range of the source database will be deleted.

.....

## 4.11 THE REPLICATOR BACKUP SERVER AND BACKUPCOMPARE FACILITIES

Version 1.60 of Replicator introduces a new Transfer Type mode called Backup. This special mode makes it possible to easily set up a backup server that is a mirror of the primary MS Dynamics NAV Server, allowing for a quick switch to the backup server in case of problems with the primary server, or for the primary server to run 24 hours being seamlessly backed up.


### Notice that...

.....

Before you setup the Backup specification and create the Sub-Specifications for all the tables (step 3 below), you should implement "Source Counter" and Actions on all tables that are not temporary tables and that contains more than just a few records. See section 4.3 and 4.4 regarding how to implement Source Counter and Actions.

.....

### Setting up a Backup server

 When setting up a backup server the following steps should be followed:

- 1 Create a Group called Backup.
- 2 Set up a Specification in which you select Backup in the Replicator Group Code and set Transfer Type to Backup.
- 3 Add all the tables you want to run Backup on as Sub Specifications to the Backup Specification. These Sub Specifications can be set up with all the normal options a Specification offers.
- 4 Create a batch job where you set Replicator to run in a loop, executing the Backup Specification.

The function (Create Sub Specifications) in the Sub-Specification List window makes it possible to easily create or add Sub Specifications to a Backup Specification.

Entering the Sub-Specification List window you press the key “Create Sub Specifications” and the following window appears:



Here you specify the number of the table or a range of tables you want to add to the Backup Specification.

If you create Backup Sub Specifications in the above manner on an already existing Backup Specification, it will add the tables in the range specified. If a given Specification already exists it will fail with an error, and you will have to delete the Specification and create the Sub Specifications again. Doing this will not update or overwrite existing Specifications.

When Replicator executes a Backup Specification, all Sub Specifications are executed/run before the database and log are committed. This ensures that all tables being backed up are consistent with each other having the same database version.

If a given table contains a field with the name Source Counter and a Source Counter key exists on the table, it is automatically added to the Specification as a table using Source Counter.

### Automatically processing all companies in a database.

**■** If you want Replicator to automatically process all companies in a database this can be done easily. You just have to create a new database record and set the Company name to "\*" .

Doing this makes Replicator process all companies in the database. Committing data is done when all companies have been processed and not after each company. It is assumed that the destination database has the same companies available.

Company name is also written in the Activity Register and Change Register in the Backup Server mode.

## BackupCompare

BackupCompare is a facility you can use in order to make a comparison of the tables in the source database (e.g. main MS Dynamics NAV server) with the tables in the destination database (e.g. Backup server). The differences (if any) will be logged in the Activity Register and Change Register (if enabled).

To make a BackupCompare, you follow the same procedure as when setting up a Backup Specification (except that Transfer Type should be set to “BackupCompare”).

When executing the BackupCompare Specification, Replicator will run through all sub-tables and compare source and destination databases writing in the Activity Register how many records should be inserted, modified or deleted for the source and destination to be equal. That means, Replicator does a full compare of the tables (like Update-Add-Delete but without changing anything).

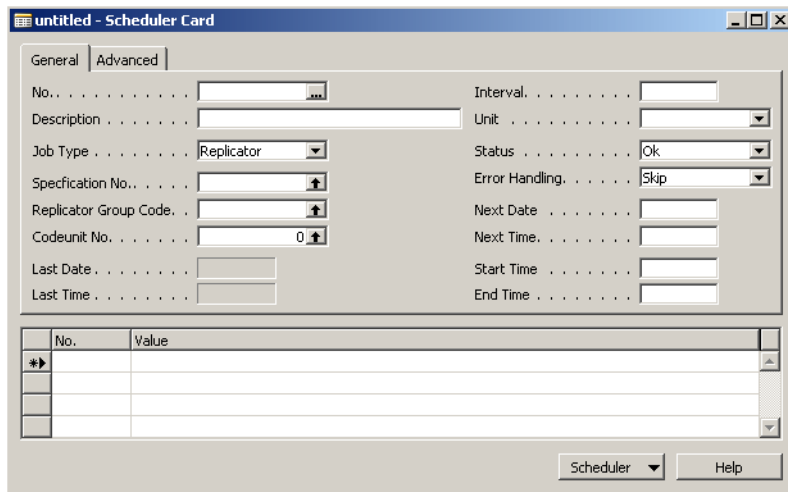
In Compare, it will ignore the Source Counter field and if the field, Log Changes, is enabled, data will be written to the Change Register with UserID as “COMPARE”.

## 4.12 THE SCHEDULER

Replicator for Microsoft Dynamics NAV includes its own Scheduler (starting with version 2.00). By using the Scheduler you can set up certain activities (Scheduler jobs) to be run automatically and repeatedly within any given interval.

You can choose between two types of Scheduler jobs:

- Replicator jobs:  
Choose to have a certain Specification or a group of Specifications run.
- Navision jobs:  
Choose to have an MS Dynamics NAV codeunit run or to print an MS Dynamics NAV report.



The Scheduler lets you control how Replicator should act, if errors occur; if it should ignore them, stop the job in question or abort totally.

With the Scheduler, you now have total control of Replicator within MS Dynamics NAV, from what data is replicated to the program and replication flow of Replicator.

Scheduler works also with Navision 3.56.



## Creating Scheduler jobs

Before creating Scheduler jobs, you have to define what kind of numbering you want your Scheduler jobs to go by. This is done as follows:

- 1 Select Setup from the Replicator main menu.
- 2 Choose Replicator Setup.
- 3 Select Numbering.
- 4 Specify the Scheduler Nos. (see section 3.2, Numbering).




Now you are ready to create Scheduler jobs.

Selecting Scheduler in the Replicator main menu, you enter the window of the Scheduler Card.

To understand the different functions of the fields see field description below:

Field Name	Field Description
No.	A unique ID of the Scheduler job.
Description	Describes the job.
Job Type	Here you select if it is a Replicator or a Navision Job.

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Field Name	Field Description
Specification No.	If the Scheduler Job is of type “Replicator” and you want to run a specific Specification, you can by pressing F6 or the lookup button  choose which Specification it should be.
Replicator Group Code	If the Scheduler Job is of type “Replicator” and you want to have an entire group of Specifications run, you can by pressing F6 or the lookup button  choose which Group it should be.
Codeunit No.	If the Scheduler Job is of type “Navision” you can by pressing F6 or the lookup button  choose the Codeunit to run.
Last Date	This indicates the last date the Scheduler job was run successfully.
Last Time	This indicates the last time the Scheduler job was run successfully.
Interval	Here you specify the time interval that the Scheduler job should be run with. It is a number and the number’ s meaning depends on the value given in “Unit”.
Unit	Here you tell Replicator what unit the time interval is given in. Possible values are: Minute(s), Hour(s), Day(s), Week(s) or Month(s).
Status	This is the status of the Scheduler job. Possible values are: OK (the Scheduler job is okay), Processing (the Scheduler job is currently being run/executed by Replicator or MS Dynamics NAV), Error (there was an error while processing the Scheduler job last time), Stopped (the Scheduler job is disabled by Replicator due to errors).
ErrorHandling	Here you have the possibility to choose between: Skip (on errors Replicator will calculate next normal time to run and set this in “Next Date” and “Next Time”), Retry (on errors Replicator will keep on trying to process this entry), Stop (on errors Replicator will stop the job until action is taken by the user).
Next Date and Next Time	The fields “Next Date” and “Next Time” indicates the date and time for when the Scheduler job will be run next. If the two fields are blank, the Scheduler job will not be run.

Field Name	Field Description
Start Time and End Time	<p>If you want to have the Scheduler job run within a specific time period, you can specify the time interval here.</p> <p>For example, let us say we want a Scheduler entry to start running at 9 p.m. and stop again at 3 a.m.. Then you set “Start Time” to “21.00” and “End Time” to “03.00”.</p> <p>If “Start Time” and “End Time” are left blank, the Scheduler entry is allowed to run at any time during the day.</p>

## Tags

When creating a Scheduler job of the type Replicator and the regarded Specification (or group of Specifications) include Tags, you can define the Tags within the Scheduler Card. Here, the Tags are defined the same way as when defining them on the command line.

In the bottom of the Scheduler Card you specify the Tag number in the field “No.” and the Tag value in “Value”.

In the previous picture we created a Replicator job running the Specifications within the group “CUST”. Since these Specifications include a Tag (determining which department database we want to replicate with), we have to define the value of the Tag within the Scheduler Card as well:

No.	Value
1	DEP1

According to the above picture, we want to replicate customer data between HQ and DEP1.

## Advanced

If you select the tab “Advanced” in the Scheduler Card you have the possibility of selecting which days of the week the job should be executed.

To select a day just mark the field.

### Running Scheduler jobs of the type Replicator

When you want to run the Scheduler concerning Replicator Jobs, you have the following options:

- From the command line prompt:  
Run Replicator with `g=scheduler` or run the command file `sched.cmd` (the file `sched.cmd` resides within the main directory of your Replicator installation).
- As a Service (NT Service) from the Replicator Service Manager (for further information, see chapter 7).
- From the Command Center (for more information, please refer to the Command Center Guide 4.30).

**Notice that...**

.....  
When starting the Scheduler this way only Replicator jobs will be run.  
.....

### Running Scheduler jobs of the type Navision

If you want to start the Scheduler concerning Navision jobs, you select Automatic Scheduler within the Replicator main menu.

Before you do this you can by choosing Setup (in the Replicator menu), Replicator Setup and the tab “Scheduler” set up rules for the Automatic Navision Scheduler (please refer to section 3.2 for more information about the tab, Navision Scheduler).

**Notice that...**

.....  
When starting the Scheduler this way only Navision jobs will be run.  
.....

## 4.13 THE COMPANYIMPORT AND COMPANYEXPORT FACILITIES

The CompanyImport and CompanyExport facilities is a solution for accountants that administrates the entire Company for their customers.

By using the facilities, CompanyImport and CompanyExport, you can create an environment where it is possible to export (replicate) a specific Company from the main database and place it on e.g. a laptop. This gives you the possibility to edit data wherever you are. While having it on the laptop it is ensured that data in this Company cannot be edited within the main database. Whenever you are done on the laptop you return to the main database and import (replicate) the Company back to the main database with all the new changes. Users on the main database now get permission to edit the particular Company again, and it is now ensured that you cannot make changes to the specific Company on the laptop. Furthermore, it is not possible to make an export of a specific Company while another user with permission to edit, is logged on to the main database.

The CompanyImport facility is used whenever you want to import a Company from e.g. a laptop to the main database. The CompanyExport facility is used whenever you want to export a Company from the main database to e.g. a laptop.

The way we control if access is permitted is through the UserID. That means, each user should have two UserIDs:

- One which allows the user to only READ Company data.
- One which allows the user to EDIT Company data.

When entering a specific Company users should first try to log on with the EDIT UserID. If this is allowed the user can proceed. If the user gets a message saying that the user cannot edit this Company, he/she can log on with the READ only UserID.

In order to use the CompanyImport/Export facilities you first need to create some fields within tables 79 (Company Information), 91 (UserSetup) and

64835 (Replicator Setup). Then you need to add code to Codeunit 1 (ApplicationManagement) on LogInStart and LogInEnd.

- On LogInStart the following should happen:  
When a user logs on we check if the user is an edit user.  
If no, the user can proceed as usual.  
If yes, we check if the Company has been exported and if it has, the user will be rejected. If the Company has not been exported, we will make a note that an edit user now is in the Company.  
Meanwhile it is impossible for another user to export the Company.
- On LogInEnd the following should happen:  
When the edit user logs of, the note about that an edit user is in the Company will be removed.

Next, you create the needed UserIDs.

As mentioned, you create two for each user. One with READ only permission and one with both read and write permissions (EDIT rights).

The only requirement here is that the EDIT UserID should end with “- E” (HyphenE). “E” is short for Edit.

For example, “Peter” is the READ only UserID and “Peter-E” is the EDIT UserID (both UserIDs can have the same password).

It is, however, possible to change the Edit UserID appendix, “-E”. For more information on this, please refer to the part “Description of the fields you created” later in this section.

When you have created the needed UserIDs, you need to specify some of the fields you have created. These are specified in all the Companies within the main database.

Finally you need to create Specifications where you set Transfer Type to CompanyExport and CompanyImport.

The following steps describes what you have to do before you create the needed Specifications.

- 1 Create the following fields within table 79 (Company Information) (must be created in both the main database as well as in the local databases. You can find a description of the fields after the example code and variables).

E.	Field No.	Field Name	Data Type	Length	Description
<input checked="" type="checkbox"/>	7600	Base Calendar Code	Code	10	
<input checked="" type="checkbox"/>	7601	Cal. Convergence Time Frame	DateFor...		
<input checked="" type="checkbox"/>	51000	EditableRepl	Boolean		Used by Replicator
<input checked="" type="checkbox"/>	51001	Export number	Integer		Used by Replicator
<input checked="" type="checkbox"/>	51002	Last Export/Import UserID	Code	10	Used by Replicator
<input checked="" type="checkbox"/>	51003	Last Export/Import Date	Date		Used by Replicator
<input checked="" type="checkbox"/>	51004	Last Export/Import Time	Time		Used by Replicator
<input checked="" type="checkbox"/>	51005	Activate Controls	Boolean		

- 2 Create the following field within table 91 (User Setup) (must be created in both the main database as well as in the local databases. You can find a description of the field after the example code and variables).

E.	Field No.	Field Name	Data Type	Length	Description
<input checked="" type="checkbox"/>	1	User ID	Code	20	
<input checked="" type="checkbox"/>	2	Allow Posting From	Date		
<input checked="" type="checkbox"/>	3	Allow Posting To	Date		
<input checked="" type="checkbox"/>	4	Register Time	Boolean		
<input checked="" type="checkbox"/>	5	Main Menu ID	Integer		
<input checked="" type="checkbox"/>	5600	Allow FA Posting From	Date		
<input checked="" type="checkbox"/>	5601	Allow FA Posting To	Date		
<input checked="" type="checkbox"/>	5700	Sales Resp. Ctr. Filter	Code	10	
<input checked="" type="checkbox"/>	5701	Purchase Resp. Ctr. Filter	Code	10	
<input checked="" type="checkbox"/>	5900	Service Resp. Ctr. Filter	Code	10	
<input checked="" type="checkbox"/>	51000	LoggeIn	Integer		

- 3 Create the following fields within table 64835 (Replicator Setup) (must be created only in the main database. You can find a description of the fields after the example code and variables).

E.	Field No.	Field Name	Data T...	Le...	Description
✓	14	Register Scheduler actions	Boolean		
✓	15	Calcdatetime Day char	Text	1	
✓	16	Calcdatetime Month char	Text	1	
✓	20	Specification Nos.	Code	10	
✓	21	Scheduler Nos.	Code	10	
✓	30	Local Database Code	Code	20	
✓	31	Central Database Code	Code	20	
✓	40	Shut Down Date (Sched)	Date		
✓	41	Shut Down Time (Sched)	Time		
✓	51000	Allow IMP/EXP Group	Code	20	Group that a user must be in to allow Import/...
✓	51001	Edit UserID appendix	Code	10	Appendix on userid that indicates edit rights

- 4 Add the needed code to Codeunit 1 on LogInStart and create the variables needed (must be created in the main database as well as in the local databases. See example of code and variables after the steps).
- 5 Add the needed code in Codeunit 1 on LogInEnd (must be created both in the main database as well as in the local databases. See example of code after the steps).
- 6 Create the needed UserIDs (must be created both in the main database as well as in the local databases).
- 7 In the main database you select Object Designer. Select table 79, Company Information, and press Run. Mark the fields EditableRepl and Activate Controls.  
 Select also table 64835, Replicator Setup, and here you specify the fields Allow IMP/EXP Group and Edit UserID appendix.  
 In Allow IMP/EXP Group you specify the group that users should be a member of in order to be allowed to import/export Companies. Within Edit UserID appendix you specify the appendix for the EDIT user (in this case, “- E”).  
 You can find a description of the fields after the example codes and variables.



- 8 In the local database you select Object Designer. Select table 79, Company Information, and press Run. Mark the field Activate Controls.

**Important...**

.....

Within all local databases you must ensure that “EditableRepl” is UNMARKED.

.....

Following are example codes and variables.

## Codes used on LogInStart and variables

```

[REDACTED] {Note in UserConf table that user is in this company}
EditUseridAppendix := '-E';
IF USERID <> '' THEN BEGIN
  {Check if user may edit this company}
  IF (STRLEN(USERID) > STRLEN(EditUseridAppendix)) THEN BEGIN
    IF (COPYSTR(USERID,STRLEN(USERID)-STRLEN
      (EditUseridAppendix)+1,STRLEN(EditUseridAppendix))
      = EditUseridAppendix) THEN BEGIN
      {user is edit-user - check if company has editable = yes}
      IF (NOT CompanyInformation.GET()) THEN
        ERROR('Company Information not created !');
      IF (NOT CompanyInformation.EditableRepl) THEN
        ERROR('You cannot edit this Company - it is currently
          exported to '+CompanyInformation."Last Export/Import
          UserID");
      {make a note in userconf that an edit-user is in the
      company}
      IF (NOT UserSetup.GET(USERID)) THEN BEGIN
        UserSetup.INIT();
        UserSetup."User ID" := USERID;
        UserSetup.LoggedIn := UserSetup.LoggedIn + 1;
        UserSetup.INSERT;
      END ELSE BEGIN
        UserSetup.LoggedIn := UserSetup.LoggedIn + 1;
        UserSetup.MODIFY;
      END;
      COMMIT;
      edituser := TRUE;
    END;
  END;
END;
```

You need to create the following local variables:

Name	Data Type	Subtype	Length
GLSetup	Record	General Ledger Setup	
GLEntry	Record	G/L Entry	
CompanyInitialize	Codeunit	Company-Initialize	
UserSetup	Record	User Setup	
CompanyInformation	Record	Company Information	
EditUseridAppendix	Text		50

And you need to create the following global variable:

Name	Data Type	Subtype	Length
Date1	Date		
Date2	Date		
Text1	Text		30
Text2	Text		30
Numeral	Integer		
i	Integer		
OK	Boolean		
edituser	Boolean		

### Code used on LogInEnd

```

{Note in UserConf table that user is in this company}
IF (USERID <> '') AND (edituser) THEN BEGIN
    IF UserSetup.GET(USERID) THEN BEGIN
        UserSetup.LoggedIn := UserSetup.LoggedIn - 1;
        UserSetup.MODIFY;
    END;
END;
```

## Descriptions of the fields you created

**Table 79, Company Information:**

Field Name	Field Description
EditableRepl.	If this field is marked it indicates that an EDIT user will be able to log on to the Company. If it is not marked, it is an indication of that the Company has been exported and the user will only be able to enter the Company with the READ only UserID.
Export number	The value of this field indicates the number of times the Company has been exported/imported.
Last Export/Import UserID	The value of this field shows the UserID of the user that last exported/imported the Company.
Last Export/Import Date	The value of this field shows the date for when the Company last was exported/imported.
Last Export/Import Time	The value of this field shows the time for when the Company last was exported/imported.
Activate Controls	When marking this field you activate the code specified in codeunit 1, Application Management.

**Table 91, User Setup:**

Field Name	Field Description
LoggedIn	Within this field you can see how many EDIT users are logged on to the Company.

**Table 64835, Replicator Setup**

Field Name	Field Description
Allow IMP/EXP Group	In this field you specify the group that users should be member of in order to be allowed to import/export Companies (the allow IMP/EXP group should be a group without permission right specifications).
Edit UserID appendix	In this field you specify the appendix for the EDIT user (- E). If you want to use another appendix instead of “- E”, you specify the new appendix here. In addition, you also need to edit the code on LogInStart to use the new appendix and of course the UserIDs.

## Specifications

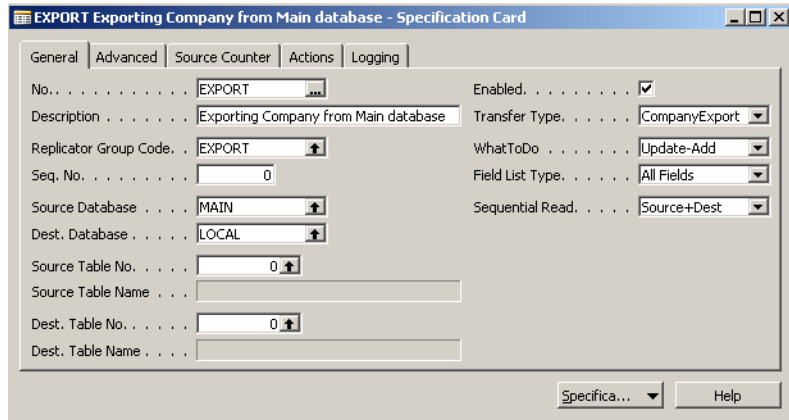
When you are done creating fields, adding code etc., you need to set up Specifications. Normally, you need to create two Specifications for each Company. One Specification with Transfer Type set to CompanyExport and one Specification with Transfer Type set to CompanyImport. However, you *can* create two common Specifications for several Companies as long as they should export/import the same tables. The way you control this, is by using a Tag so that you define which Company should be either imported or exported when running the Specifications on the command line prompt. How to define a Tag for this purpose will be explained later in this section.

## How to create a CompanyExport Specification

The following steps will guide you through how to create a Specification handling the export of a Company:

- 1 Select Specifications in the Replicator main menu.
- 2 Enter the Specification Card.

3 Create a new Specification where you specify the following:



4 Add the tables you want to export as Sub Specifications.

The above Specification is executed by running Replicator from the command line prompt with:

```
repnt g=export 8=<UserID(with import/export rights)>  
9=<Password>
```

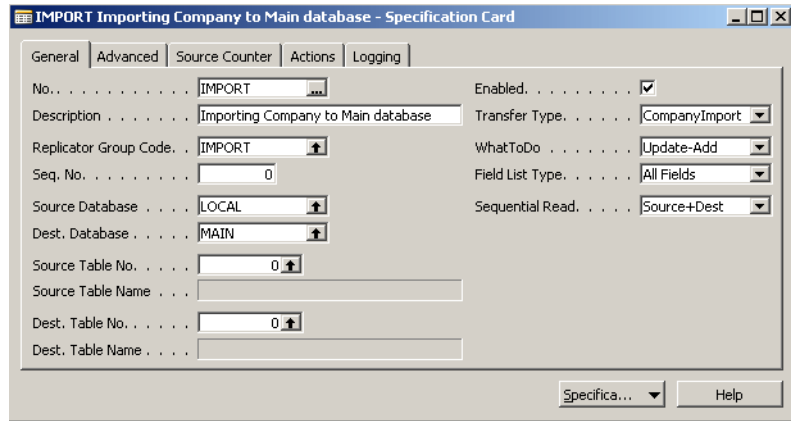
(the UserID used should be part of the “Allow IMP/EXP Group”).

### How to create a CompanyImport Specification

The following steps will guide you through how to create a Specification handling the import of a Company:

- 1 Select Specifications in the Replicator main menu.
- 2 Enter the Specification Card.

3 Create a new Specification where you specify the following:



4 Add the tables you want to import as Sub Specifications (must be the same Sub Specifications as when you created the CompanyExport Specification).

The above Specification is executed by running Replicator from the command line prompt with:

```
rept g=import 8=<UserID(with import/export rights)>
9=<Password>
```

(the UserID used should be part of the “Allow IMP/EXP Group”)

### Several Companies using two common Specifications

If you have two or more Companies that should export and import the same tables it is enough to create two common Specifications and then define a Tag that lets you decide which Company to use whenever running one of the common Specifications.

To ensure this you have to specify a Tag number (e.g. %1) all the places where you within the Database Card specified a Company name.

You can run the Specifications from the Command Center.

## Chapter 4. Special facilities in Specifications

When running one of the common Specifications you must remember to add:

```
<Tag number>=<Company name>
```

For example: 1="CRONUS International Ltd."

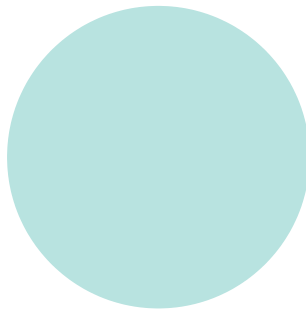
For more information about Tags see section 4.6.



## **Chapter 5**

### The Replicator Server

This chapter contains information about the Replicator Server facility.

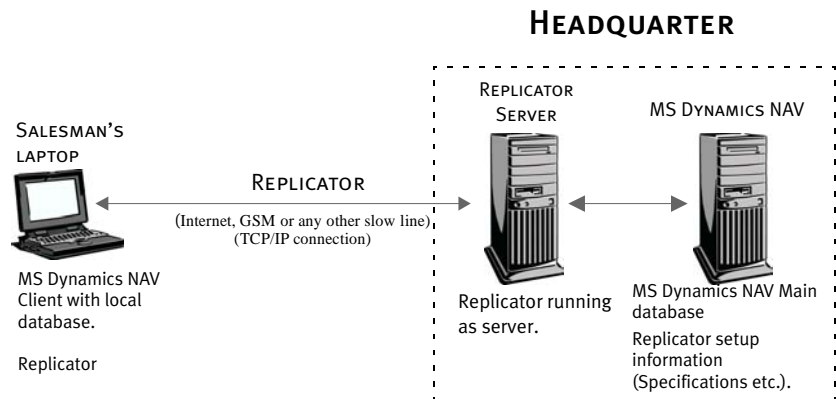


### 5.1 THE REPLICATOR SERVER FACILITY

The Replicator Server facility reduces the total transfer time significantly when transferring data via internet or mobile phones. Only the required data is compressed and transferred.

For example, replication between a salesman's laptop and the headquarters where the communication method in use is GSM (Mobile Phone Modem), you may increase the speed significantly.

The following illustration is an example of how a Replicator Server solution could be implemented in such a situation:



As you can see the Replicator Server functions as the connection link between the salesman's local database and the head quarter's main database (the Replicator Server can also be installed on the MS Dynamics NAV server running the main database and containing the Replicator Setup Information).

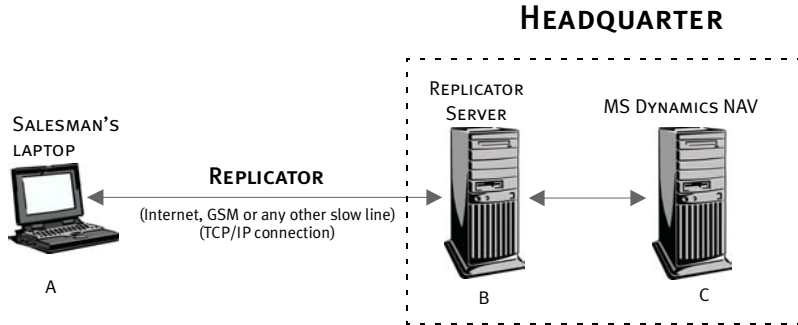
The function of the Replicator server is to wait until it gets told what to do, (this happens each time the salesman runs Replicator from his laptop) and then peel of unnecessary information of the data being transferred (such as MS Dynamics NAV C/AL code), compress the data and forward it as packages. That means, several records will be send at the same time instead of

only one at a time. All of this will reduce the total transfer time and thereby the replication speed increases.

The Replicator Server can handle several clients connecting at the same time.

## 5.2 HOW TO INSTALL AND SET UP THE REPLICATOR SERVER

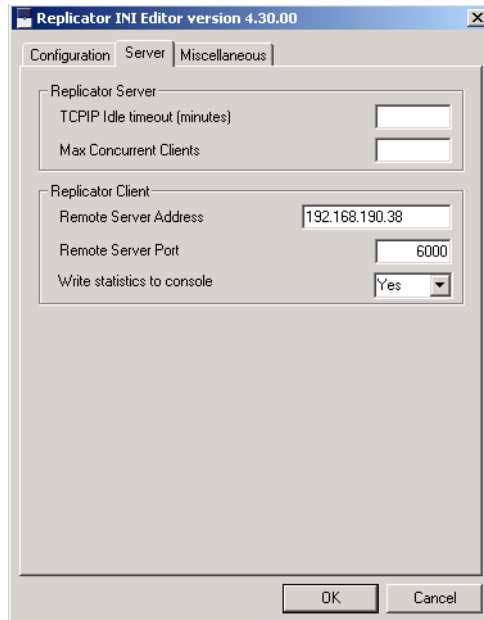
In this section we will explain how to install and set up the Replicator Server.



### On the computer where you run the Replicator Specifications (A)

In order to tell Replicator that data should be replicated via the Replicator Server you enter the Replicator INI Editor.

- Under the tab “Configuration” you find the parameter “Installation Path”. Here you write the path to where you have installed an MS Dynamics NAV Client on the Replicator Server.
- Under the tab “Server” you have to specify the TCP/IP address of the Replicator Server (Remote Server Address) and which TCP/IP port number (Remote Server Port) the Replicator Server uses. You can also specify the parameter “Write statistics to console”. If you set this parameter to “Yes” you can have statistics written to console. The statistics written to console includes information such as the table number of the data being written, as well as how many records are send. In this way you can follow how well your setup is performing.



**On the computer where you want to run the Replicator Server (B)**

- Ensure that you have an MS Dynamics NAV Client installed.
- Install the Replicator Server according to section 2.4 and 2.6.

**The remote database you want to replicate with via the Replicator Server (C)**

- On the computer where you have set up Replicator, you enter the Database Card of the remote database (for example “HQ”). Here you choose the tab “Remote Server” and write the TCP/IP address of the Replicator Server and which TCP/IP port number the Replicator Server uses. You also have to edit the field “Installation Path” where you now specify the path to the main directory of the MS Dynamics NAV Client installed on the Replicator Server.

### Installation step by step



Below, the installation is explained in steps:

- 1 On the computer from where you want to run the Replicator Server you install Replicator.
- 2 Enter the Replicator Setup Application and select Database Card. Locate the database record(s) that should replicate to e.g. the laptops via the Replicator Server. Here you select the tab, Remote Server and specify the TCP/IP address of the Replicator Server and which TCP/IP port number the Replicator Server uses.
- 3 If you (from the laptop's point of view) have to get via the Replicator Server in order to get to the Replicator Setup Information you have to edit the Replicator INI Editor (`replicat.ini`) on the laptop. Here you specify the TCP/IP address of the Replicator Server and specify which TCP/IP port number the Replicator Server uses.

This completes the installation of the Replicator Server.

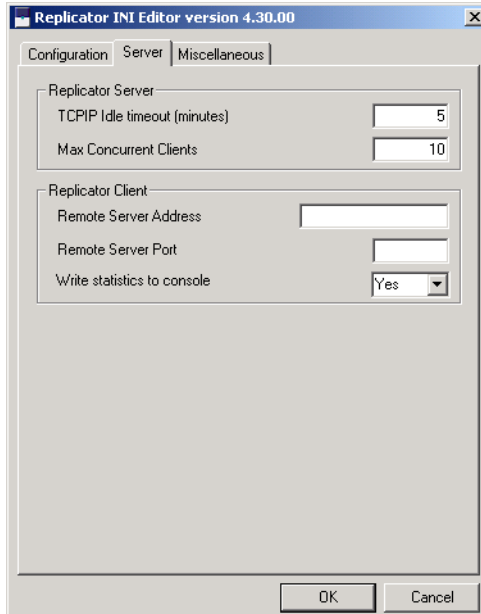
## 5.3 HOW TO RUN THE REPLICATOR SERVER

Now you are ready to run the Replicator Server. There are three options when running the Replicator Server:

- You can run the Replicator Server as a Service (Windows Service). Please see chapter 7.
- You can run the Replicator Server from the Command Center. Please see the Command Center Guide 4.30.

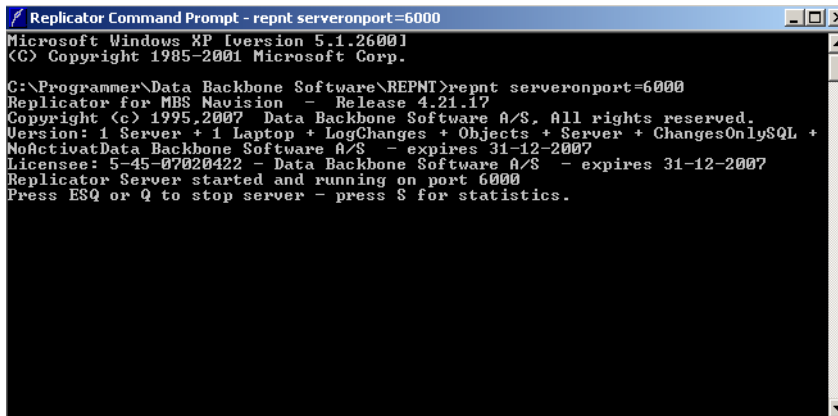
You can run the Replicator Server from the command line prompt. When running the Replicator Server from the command line prompt you can specify the following parameters within the Replicator INI Editor under the tab Server:

Parameter	Parameter Description
TCPIP Idle timeout(minutes)	This field allows the Replicator Server to detect an idle connection and kill that idle connection.
Max Concurrent Clients	<p>Here you specify the maximum number of concurrent clients allowed to connect to the Replicator Server.</p> <p>The Replicator Server dynamically administers connections to the central server (e.g. to HQ) - if the database specification says to use directory HQ, and there is already one client connected that is using the HQ directory to connect to the server, then the Replicator Server create a new directory under the Temp directory containing the needed Navision files. The directory will be called HQ001. If other clients try to connect and both HQ and HQ001 is in use it will create the directories HQ002, HQ003 etc.</p> <p>The Replicator Server will use up to Max Concurrent Clients + 1 Navision session when running.</p>



In order to run the Replicator Server from the command line prompt you have to specify which port number the Replicator Server should use.

```
repnt serveronport=<The TCP/IP port number>.
```



To shut down the Replicator Server you have to press “ESQ” or “Q”.

If you press “S” the statistics will be shown on the console - including information on any active connections.



If you want to shut down the Replicator Server at a specific time you have to specify the following:

```
rept serveronport=<The TCP/IP port number> shutdown-  
time=<HH:MM>
```



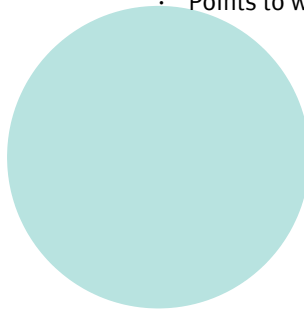
## Chapter 6

### Running Replicator

In this chapter we will describe how to run Replicator.

The following will be covered:

- Running Replicator.
- Running Replicator from a command line prompt.
- What happens when running Replicator?
- Points to watch out for while replicating.



## 6.1 RUNNING REPLICATOR

To actually transfer what you defined in the Specifications, you need to run Replicator.

This can be done the following ways:

- From a command line prompt.
- From the Command Center (see Command Center Guide 4.30).

However, before being able to run Replicator you need to enter the Replicator INI Editor to edit the file `replicat.ini` (see section 2.7).

## 6.2 RUNNING REPLICATOR FROM A COMMAND LINE PROMPT

When running Replicator from a command line prompt the following command line parameters can be used:

Command line parameter	Description
<code>g=&lt;Group Code&gt;</code>	If you want to run a group of Specifications you run Replicator with this parameter. For example if you want to run the group "Customers" you apply the following on the command line prompt: <code>repnt g=customers.</code>
<code>g=design</code>	If you want to transfer the design of a database into the setup database you run Replicator with: <code>repnt g=design.</code> Replicator will transfer the design of the database records where "Read Design" has been marked.
<code>test=&lt;Database Code&gt;</code>	With this command you are able to test that the connection to a database is OK.
<code>t=screen</code>	If you run Replicator with this parameter, trace information will be written to the screen.
<code>t=&lt;filename.txt&gt;</code>	If you run Replicator with this parameter, trace information will be written to a text file.
<code>traceon</code>	Enables the CTRACE environment variable. When enabled, the most detailed information possible (level is set to wild) will be written to the file "trace.txt.
<code>traceoff</code>	Disables the CTRACE environment.
<code>L=min</code>	This parameter logs only minimum of information into the Activity Register. Useful with Backup server.
<code>L=none</code>	This parameter logs only Source Counter information into the Activity Register.
<code>g=scheduler</code>	If you want to run Replicator as a Scheduler you run Replicator with this parameter.

Other parameters you can use on the command line prompt to tell the Replicator how to get to the setup database.:

Command line parameter	Description
f=yes	If the setup database is an MS Dynamics NAV database you add f=yes. If not you omit the parameter.
s=<servername>	If the setup database is placed on a server you apply the name of this server.
n=netb or n=tcp	Nettype used to access the server. Can be either NetBIOS (default) or TCP/IP.
d=<database path & name>	Database path and name if the setup database is a local database – enter both path and name as in C:\NAVI\DATABASE.FDB.
c=<company>	Company name where the Setup Information is found. For example c="CRONUS~International~Ltd." Blanks are replaced with "~".
u=<UserID>	UserID that can be used to access the database. This UserID does not have to be superuser; it only needs to have access (read + write) to the tables.
p=<password>	Password for the above UserID. If the database does not have any users created, you may omit both UserID and password.

**Notice that...**

.....  
 To see remaining parameters you can apply, `repnt ?` on the command line prompt.  
 .....

## 6.3 WHAT HAPPENS WHEN RUNNING REPLICATOR?

One thing that is important to know is how Replicator actually works, how it connects and reads Specifications, and acts in-between.

When running Replicator from the Command Prompt it first parses the command line prompt. When a Group is applied (G=) it sets a range on the Specifications with that Group. It selects the key “Replicator Group Code+Seq.No” to run through the Specifications, and it then runs through all enabled Specifications that is within the range.

Each Specification is handled the following way regardless of from where you run Replicator:

- Read Specification.
- Update Specification with Tags if any (tags is explained in section 4.6).
- Read source and destination database information.
- Connect to server or open the database (both source and destination).
- Login to Company if needed.
- Transfer data.
- Handle all Sub Specifications if any (no commit is done on Sub Specifications).
- Commit changes (destination).
- Update the Activity Register.
- Logout.
- Disconnect from server or local database (both source and destination).

This also means that if the connection to the server or local database is broken the transfer of data will be updated to the last successful main Specification.

## 6.4 POINTS TO WATCH OUT FOR WHILE REPLICATING

There are two things to watch out for while using Replicator:

- **Compression of entries:** Although, in MS Dynamics NAV you have the option of compressing data, this should not be used unless the entries are replicated using Update-Add-Delete, or a batch job is controlling the deletion of entries. Compression of data creates problems with especially the Source Counter feature.
- **Renaming Records:** This can cause problems with Replicator since the Primary Key might change. Therefore, should you choose to rename any records you will have to check all the transferred data in the destination database to make sure that all the related tables are correctly replicated.

In general, it is advisable to avoid both compression of entries and renaming of records since both situations can cause problems with the optimal performance of Replicator.



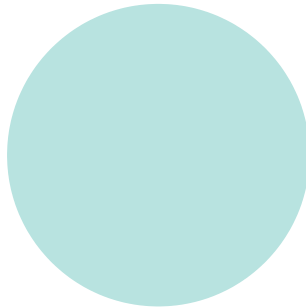
## Chapter 7

### Running Replicator as a Service (Windows Service)

This chapter explains how you can set your program to run certain tasks as Services (Windows Services).

The following will be covered:

- Running the Replicator Scheduler as a Service.
- Running the Replicator Server as a Service.



## 7.1 REPLICATOR SERVICE MANAGER

If you want Replicator to run certain tasks unattended they can be run as Services (Windows Services).

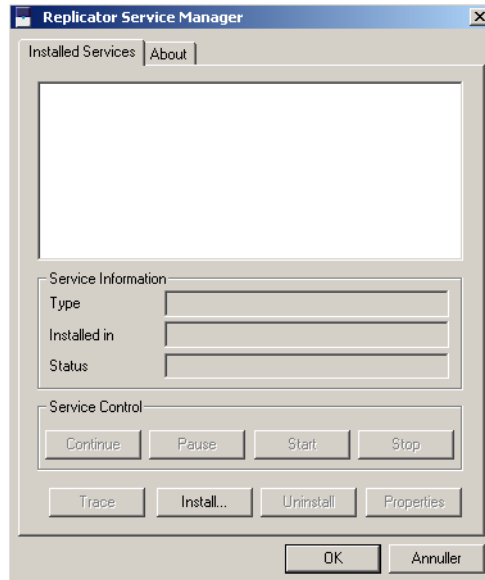
The tasks you want to have run as Services are set up in the Service Manager.

On the computer where you have installed the Replicator program you can enter the Replicator Service Manager by pressing the following icon within the Control Panel window:



Replicator Service Manager

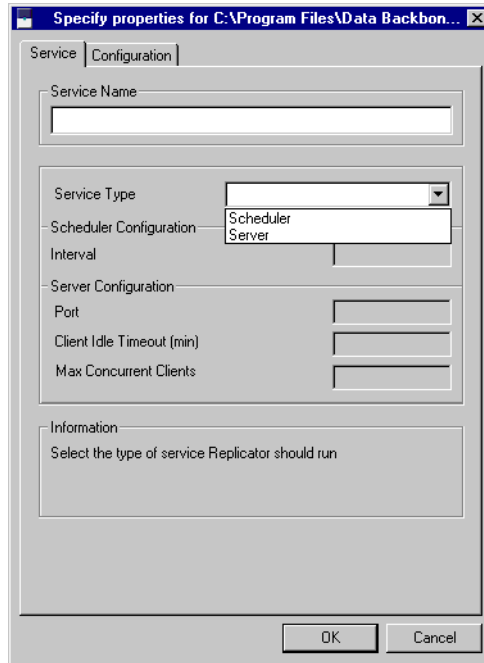
## 7.2 HOW TO INSTALL A SERVICE



If you want to create a Service, you press the button “Install” and specify the path to Replicator’s executable file ( `repnt.exe` ).

One Service can only relate to one `repnt.exe` file.

When pressing “Install” you enter the following window (after you have located and chosen the Replicator executable file):



In “Service Name” you specify the name that the Service should be known under in Windows.

**Notice that...**

.....

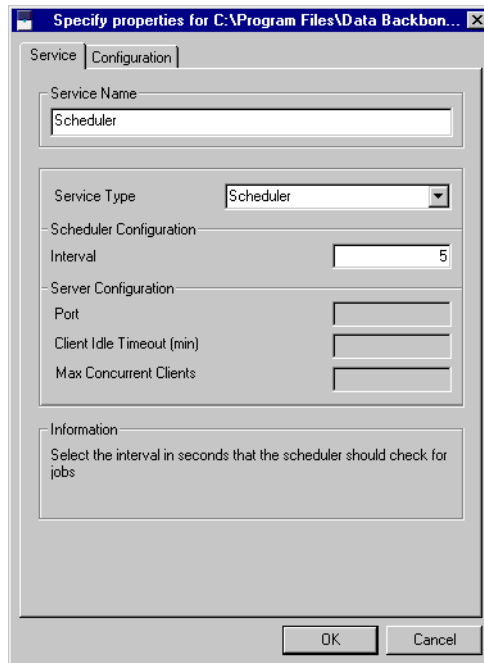
You will get an error message if you specify a Service with the name of another Service. Not just a Service from the Service Manager but Services on your computer in general.

.....

In “Service Type” you select the type of Service. You can choose between Scheduler or Server.

## Scheduler

If Service Type is set to “Scheduler”, you need to enter the tab “Configuration” before running the Scheduler.

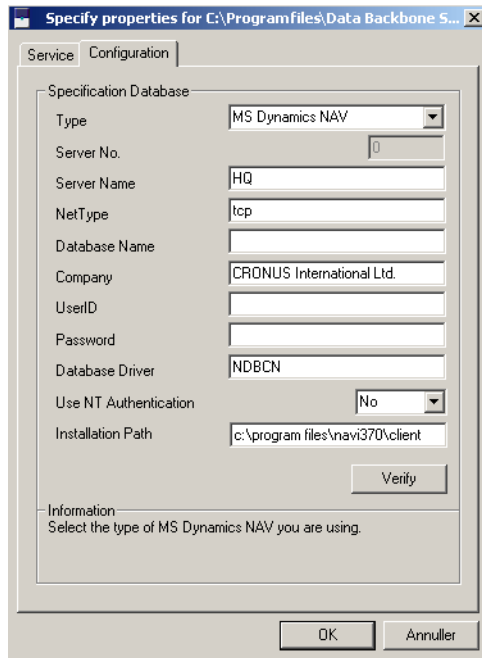


### Configuration

When you want to run the Scheduler as a Service the Service Manager needs to know where to find the Replicator Setup Information (i.e. where you set up the Replicator Scheduler).

The Service you install will use the configuration specified in `replicat.ini` as a suggestion. If you want to change this configuration you enter the tab Configuration.

## Chapter 7. Running Replicator as a Service (Windows Service)



How to specify the parameters is described as follows:

Configuration parameter	Description
Type	Here you specify, if the database is a Navision 3.56 or an MS Dynamics NAV database.
Server No.	If it is a Navision 3.56 database you specify the server number of the Navision 3.56 server.
Server Name	If the database is on an MS Dynamics NAV server or on an MS-SQL Server, you specify the name of the server here.
Net Type	If the database is hosted by a server, you specify the network protocol type here. Can be either TCP/IP (apply "tcp") or NetBIOS (apply "netb"). If nothing is entered, the default is NetBIOS. If the database is hosted by an MS-SQL Server, this parameter is specified differently. Please refer to the MS Dynamics NAV for MS-SQL Server on-line help.

Configuration parameter	Description
Database Name	If the database is hosted by an MS-SQL Server, you specify the name of the database here. If the database is a local database you leave the parameters “ServerName” or “Server No.” and “NetType” blank and specify the exact location of the database instead (path and name).
Company	Specify the name of the Company that should keep the Configuration data (the Specification etc.). PLEASE NOTE: Company name is case sensitive!
UserID	If the database is protected by UserID and Passwords, you specify a UserID here. Since Replicator only needs access to read and write to tables it is a good idea to create a specific UserID for Replicator and give it access to all tables, both read and write, but remove all access to forms and codeunits, this will render the UserID useless for all others, but Replicator.
Password	Apply the Password for the UserID here, if any
Database Driver	By default this parameter is set to NDBCN. Only if the database is hosted by an MS-SQL Server you set the parameter to NDBCS.
Use NT Authentication.	If you use the same UserID and Password to access the database as for logging on to your Windows NT platform, you can set this parameter to “Yes”. If you do this then leave the parameters UserID and Password blank. PLEASE NOTE: “Use NT Authentication” is only valid from version 2.50 of Navision Financials.
Installation Path	Specify the path to the main directory of your MS Dynamics NAV or Navision 3.56 installation. It must be the path on the computer from where you want to run Replicator.

With the button “Verify” you can check that access to the database is possible using the specified parameters. If this verification is successful, it means that the Service Manager will be able to use this Configuration when running the Services.

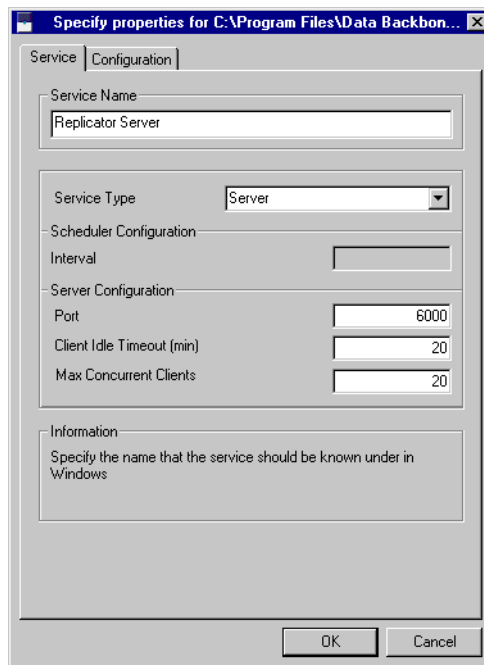
Now the Scheduler is installed as a Service and ready to be run.

When you press OK you return to the installation window from where you can mark and start the Scheduler (see section 7.3).

For further information on Scheduler please see section 4.12.

## Server

If Service Type is set to “Server” you specify the Server’s port number and how long an idle client may be logged on to the Server before being disconnected. You can also specify “Max Concurrent Clients”



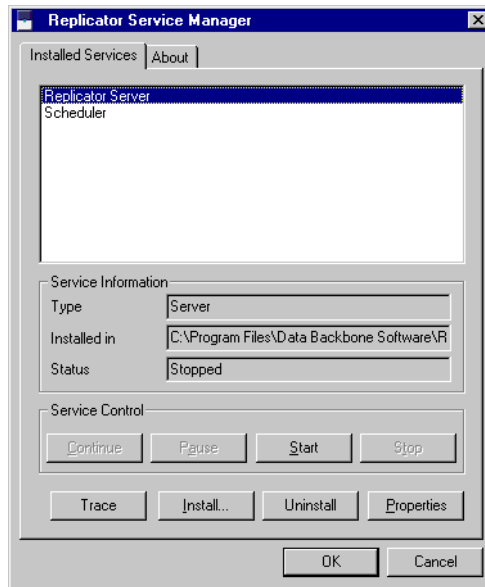
When you want to run Server as a Service you do not have to enter the tab “Configuration”. When the Server is installed it is ready to start running (see section 7.3).

For further information on the Replicator Server please see chapter 5



## 7.3 HOW TO RUN SERVICES

When you have installed one or more Services you can start them from the following window:



To start a Service you simply mark the requested Service and press the button “Start”. You can also Pause, Continue or Stop a Service.

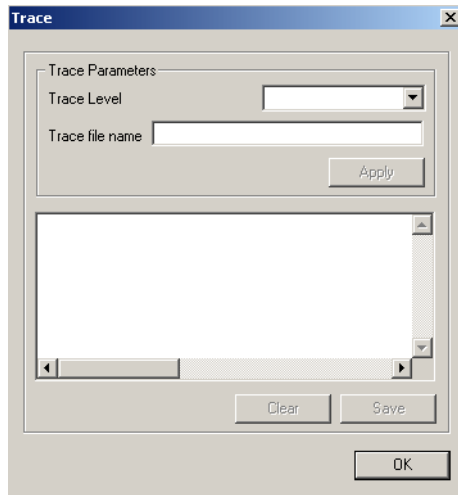
When you have started the “Service” the parameter “Status” will be set to “Running”.

Following is a description of all the parameters within the “Service Information” area as well as the buttons “Trace”, “Uninstall” and “Properties”:

Service information	Description
Type	Service type.
Installed in	Shows which <code>repnt.exe</code> the Service relates to.

Service information	Description
Status	Shows the status of the selected Service. This can be: <b>Starting:</b> The Service is initializing. <b>Running:</b> The Service is running. <b>Stopped:</b> The Service has stopped running. <b>Paused:</b> The Service has been paused. <b>Stopped pending:</b> The Service is about to stop running. <b>Paused pending:</b> The Service is about to be paused. <b>Continue pending:</b> The Service is about to continue running.

### The Trace button



The Trace facility lets you see what happens while the Service Manager is running the Services.


With the Trace facility you have the following main options:

- Having Trace information written to a file:  
Specify a Trace Level, specify where you want the file to be created as well as the name of the file (for example, “c:\replicat\trace.txt”). Then press “Apply” (if you do not want to have trace written to a file, just leave the parameter “Trace file name” blank).

### Trace levels

- Disabled:  
When you use “Trace file name” you can under “Trace Level” choose “Disabled”. This will temporarily disable that trace information to be written to the specified file.
- Default:  
Shows common program information and error messages. The information is of less technical character.
- Program Flow:  
Shows the same as Default plus function headers.
- Level 2:  
Shows the same as Program Flow plus the position within a function.
- Level 3:  
Shows the same as Level 2 plus more detailed information about the position within a function as well as technical information about how your program manages the data process.
- Wild:  
Shows all the information available.


### The Uninstall button

 If you want to remove a Service, you select the Service and press the button “Uninstall”.

#### Notice that...

.....  
If the Service is running, you first need to stop it in order to remove it.  
.....

### The Properties button

 If you want to edit the parameters in a Service, you can use the button “Properties”.

## Chapter 7. Running Replicator as a Service (Windows Service)

## Chapter 8

### Advanced Example

In this chapter we will go through an advanced example of how to set up a transfer of customers using Source Counter to detect changed records and using Actions to delete records. This chapter is intended to cover a big part of what is needed when implementing a Replicator solution in a customer situation.

The example will be presented in three parts covering the following topics:

#### PART 1: (Setting up transfers of changed data)

- Creating Source Counter.
- Creating Specifications for the entire table.
- Creating Specifications for specific fields.
- Adding fields to a Field list.

#### PART 2: (Rules on transfers)

- Defining rules for when transferring data.
- Using the facilities Groups and Seq. No.

#### PART 3: (Setting up transfers of deletions)

- Handling deletions using the Actions facility.

## 8.1 BEFORE WE BEGIN

An essential point when replicating data is to keep the amount of data that are being replicated at a minimum. This is especially important for large tables. Smaller tables such as posting-groups, departments, projects, etc. which only contain a few records are easily handled with setting up a Specification that does a total replication with "Update-Add-Delete". However, for tables such as customer, Products, SalesHeader+Lines, there is often too much data to do a total replication each time, especially if you are using a slow modem connection.

### Replicating only changed data

In order for us to replicate only changed data from the database, we need to do some programming that will mark the record as changed, every time the record has been changed or a new record added.

Replicator offers two ways of detecting changed data:

- By using the Flag Field (see section 4.2).
- By using the Source Counter (see section 4.3).

When deciding on which approach to use, the most important thing is to consider if more destinations are going to replicate the same table at any given time or not.

#### Replicating one to many

If you know the replication is going to be one to many, you should use the Source Counter.

#### Replicating one to one

If you know the replication is always going to be one to one, both the Flag Field and the Source Counter can be used.

For performance reasons we recommend to use Source Counter.

## 8.2 PART 1: SETTING UP TRANSFERS OF CHANGED DATA

### The situation

We want to transfer customer data between our headquarters and two departments.

Before setting up the transfers of data we have worked through the following steps:

- We have installed Replicator according to chapter 2.
- We have created three databases within the Replicator Setup Application (HQ, DEP1 and DEP2) so that Replicator will be able to find the databases.
- We have defined what kind of numbering our Specifications should go by.

In this example, we do not need to transfer the design from any of our databases into the database where Replicator is set up since:

- The three databases we want to replicate between have the same design as the design of the Replicator setup database.

It is requested that the departments can receive updates on their own customers from the headquarters and that the departments can update the customer's address and attention but nothing else. That means, we have data flowing in both directions and we have to take care of that the update of customers is done the right way.

To reduce the amount of data that is being transferred, we will make use of the Source Counter facility. The reason why we use Source Counter is that we already know that replication is going to be from one source to many destinations.

So, before we create the Specifications needed we have to let Replicator know that it should use Source Counter in order to detect changed data.

## Creating Source Counter

We create the Source Counter in all three databases.

To create the Source Counter, follow the steps below (if necessary see section 4.3).

- 1 Create a Source Counter field (type BigInteger) within the customer table.
- 2 Create a key with the field.
- 3 Create the variables needed.  
(A record variable, which we in this example call Customer2, pointing to the customer table, and the Replicator Functions codeunit variable, pointing to the codeunit Replicator Functions).
- 4 Add the following code on the Source Counter field itself (SourceCounter – OnValidate).

```
IF Customer2.SETCURRENTKEY(SourceCounter) THEN BEGIN
    IF NOT Customer2.FIND('+') THEN
        SourceCounter := ReplicatorFunctions.GetNextSCNumber(18)
    ELSE
        SourceCounter := Customer2.SourceCounter + 1;
END;
```

- 5 Call the above Source Counter code with VALIDATE(SourceCounter) where customers are Modified and Inserted.

In this example we use the code to make a search in the table itself, instead of having a table where we lookup the next number.

Making a search in the table itself has several advantages:

- No lookup with a following modification of another table is needed.
- No waiting for locking will happen if another person is also reading/modifying such a table.



- The Source Counter key is already in memory or will shortly be updated for the modification of the record.
- Little impact is done on the existing MS Dynamics NAV application.

**Notice that...**


.....  
 A test should be made on the Source Counter key before the actual update is done, this makes it easier to disable the "Replicator code" if it is not needed.  
 .....

Knowing that we have a functional Source Counter to mark new and modified customer records, we are ready to create the Specifications needed.

**Notice that...**

.....  
 The Source Counter code used here is compatible with all versions of MS Dynamics NAV. If you use MS Dynamics NAV 3.70 or later you can also use the code shown in Appendix B.  
 .....

**Creating Specifications transferring the entire table**

 First we create the Specifications that should take care of replicating data from the headquarters to the departments. For this we need to create two Specifications. One from HQ to DEP1 and one from HQ to DEP2.

- 1 Create the two Specifications as follows: (if necessary see section 3.4).

Field Name	Fill in with...
No.	Give each Specifications a unique ID. (E.g. "HQ-DEP1-18" and "HQ-DEP2-18").
Description	Fill in a descriptive text. (E.g. "Customers from HQ to DEP1" and "Customers from HQ to DEP2").
Source Database	HQ

Field Name	Fill in with...
Dest. Database	Fill in the Code of the destination database. (E.g. DEP1 or DEP2).
Source Table No.	18
Transfer Type	Normal
WhatToDo	Update-Add
Sequential Read	Source only
Source Counter Field	Type your Source Counter field number here.

- 2 To ensure that each department only gets the customer records belonging to them we need to set up a Source Filter on the field Department Code (if necessary see section 3.5, Filters).

**Notice that...**

.....

We have specified the Source Counter field so that new and modified customer records will be marked and thereby only these records will be transferred.

.....

We use Update-Add ensuring that existing records will be updated and new ones will be added.

.....

For performance considerations we only read (Sequential Read) in the Source Database.

.....

We have a source Filter set on the field "Department Code" so that each department only get updates on their own customers.

.....

**Creating a Specification transferring specific fields**

Now that we have created the Specifications that move data from HQ to DEP1 and DEP2, we need to create the Specifications that will move data from DEP1 and DEP2 to HQ. The requirement here is that only some data could be modified by DEP1 and DEP2. This is ensured by specifying which fields should be transferred within the Field List.

1 Create two Specifications as follows:

Field Name	Fill in with...
No.	Give each Specification a unique ID. (E.g. "DEP1-HQ-18" and "DEP2-HQ-18").
Description	Fill in a descriptive text.
Source Database	Choose the source database (DEP1 or DEP2.)
Dest. Database	HQ
Source Table No.	18
Dest. Table No.	18
Transfer Type	Normal
WhatToDo	Update
Sequential Read	Source only
Source Counter Field	Type your Source Counter field number here.

**Notice that...**

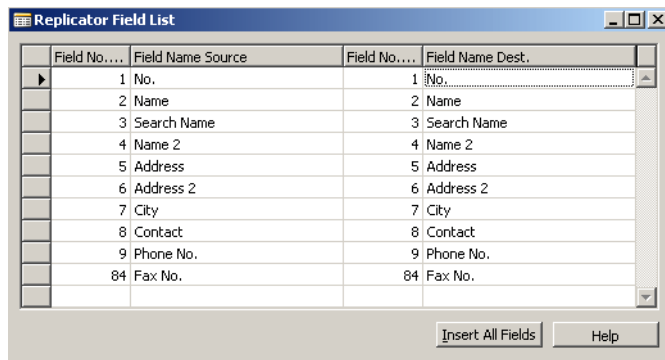
.....  
We have specified the Source Counter field so that new and modified customer records will be marked and thereby only these records will be transferred.  
.....

We only do an Update in WhatToDo, ensuring that DEP1 and DEP2 cannot add new customers.  
.....

### Adding fields to the Field List

On the two Specifications “DEP1-HQ-18” and “DEP2-HQ-18” we now need to specify which fields we want to be able to update within the headquarters.

- 1 Enter Field List in the Specification Card pull-down menu.
- 2 Specify the fields to be transferred.



When adding fields to the Field List the Field List Type on the Specification Card will automatically change to “Include List” informing you that only the fields included in the Field List will be replicated.

## 8.3 PART 2: SETTING UP RULES


Now that we have the customers set up to be transferred in both directions, only one thing remains. We have to make sure that the order of the replication is correct.

For example, if the Specification transferring data from HQ to DEP1 was run first, and both HQ and DEP1 had changed the same customer, that would overwrite the changes that DEP1 had made to the address on a given customer.

These problems will always arise when talking about replication. The only way to deal with them are to define a set of rules that must be obeyed when modifying data, and to define who will have the last word in changing data.

There is **no** way of knowing and setting up general rules for situations like this, one always has to analyse which options there are to solve a conflict, and set up the different possibilities for transferring the data, and then select the way that will best accommodate these needs.

### Defining rules for when transferring data

 In this example, we will define the following rule:

- Changes in address done by DEP1 and DEP2 have priority over HQ if changed at the same time.

This makes it fairly easy to solve our problem, because we only have to assure that the Specifications transferring data from DEP1 and DEP2 are run before the Specifications sending data from HQ. We can do this by using the the Groups facility and the Seq. No.

Strictly speaking, we do not need the Groups facility but it makes it easier to maintain the solution as it expands.

- 1 Add a Group called "Customer".
- 2 Select the Group in the field Replicator Group Code in all Specifications.

- 3 On the Specifications transferring data from DEP1 and DEP2 to HQ, you specify 1 and 1 in the field Seq. No.
- 4 On the Specifications transferring data from HQ to the departments you specify 2 and 2.

By setting the Seq. No (Sequential number) this way, we ensure that the Specifications transferring data from the departments are run before the Specifications transferring data from the headquarters.

By using the field Seq. No you tell Replicator in what order it should run the Specifications.

**Notice that...**

.....

It is possible that both HQ and e.g. DEP1 changed the same customer, but HQ did not change any address information, in this case the replication will not overwrite anything, both changes would be present in the databases.

.....

## 8.4 PART 3: SETTING UP TRANSFERS OF DELETIONS

Next we want to implement deletions using the Actions facility.

To transfer deletions using Actions, we only need to go through a few steps:

- Add code on the delete trigger.
- Setup a Specification sending deletions, making sure it is executed before DEP1 and DEP2 updates the addresses to HQ.

Generally, it is a good idea to have Replicator execute Actions before any other replication is done.

When using delete, the following situation could arise that would be a problem:

E.g. DEP1 replicates with HQ and DEP1 stopped with the Source Counter at 534. Now HQ deletes the customer having Source Counter 534 so the largest Source Counter in the table is 533. A new customer is created in HQ getting Source Counter 534. DEP1 replicates again and the replication will start with the filter "535," on the Source Counter.

With this scenario DEP1 would never get the new customer which was given Source Counter 534, until the customer was modified again. So we have to take care of that problem in delete, making sure that it will never happen! This issue is important even if we did not send deletions to the remote database. We do this the following way:

- If the customer being deleted has the last Source Counter we find another customer with Source Counter one lower and update that to the highest Source Counter.
- If no other customer is found Replicator will temporarily keep the last Source Counter within Replicator table, Last SourceCounter Numbers, until a customer is added.

The code we suggest using for this check is the following:

```

IF Customer2.SETCURRENTKEY(SourceCounter) THEN BEGIN
  Res := Customer2.FIND ('+');
  IF ((Customer2.SourceCounter <> 0) AND
    (Customer2.SourceCounter = SourceCounter)) THEN BEGIN
    IF Customer2.FIND('><') THEN BEGIN
      Customer2.SourceCounter := SourceCounter;
      Customer2.MODIFY();
    END ELSE BEGIN
      // Write last Source Counter into "Last SourceCounter
      // Numbers" table.
      ReplicatorFunctions.UpdateLastSCNumber(18,
        SourceCounter);
    END;
  END;
  { Then update Actions }
  ReplicatorFunctions.ActionDelete(18, "No.");
END;

```

- 1 Within the main database you add the above code to the OnDelete trigger.
- 2 Create two Specifications that should handle the transfer of Actions from HQ to DEP1 and from HQ to DEP2:

Field Name	Fill in with...
No.	Give each Action Specification a unique ID (e.g. "Act-DEP1" and "Act-DEP2").
Description	Fill in a descriptive text.
Source Database	HQ
Dest. Database	Specify the destination database (DEP1 or DEP2)
Transfer Type	By Actions



- 3 We also need to assure that our Action Specifications are run before all other Specifications, so we create a new group called ACTIONS. Then we enter the two Action Specifications and assign them to the Group ACTIONS (within the field, Replicator Group Code).

When replicating data all we need to remember is to run the group ACTIONS first.

Now we are ready to transfer customer changes in both directions, including deletions.

**Notice that...**

.....  
The code used here is compatible with all versions of MS Dynamics NAV. If you use MS Dynamics NAV 3.70 you can also use the code shown in Appendix B to handle the creating of Actions and Source Counter.S  
.....

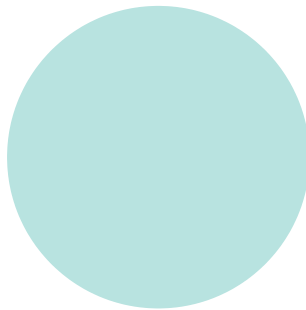
This completes the advanced example.



## **Appendix A**

### **Troubleshooting and Error Messages**

This appendix provides troubleshooting solutions for Replicator for Microsoft Dynamics NAV and lists error messages with possible solutions to these errors.



## A.1 TRACING ERRORS

A powerful debugging tool has been built into Replicator.

This tool is activated from the command line prompt with “T=” where you can either specify `T=SCREEN` to get it on the screen or `T=<filename.txt>` to have it written to the specified file.

If using Replicator Server and you want to create a trace file on the Server side you have to activate “traceon.cmd”. From the command line prompt you run with the command `traceon` to activate `traceon.cmd`. Then run with the command `repnt g=customer` to have it written to the file “trace.txt” which is situated in the library where you installed Replicator.

To deactivate “traceon.cmd” you have to activate “traceoff.cmd”. From the command line prompt you run with the command `traceoff`. Now information will no longer be written to the file “trace.txt”.

The information that is displayed is a very detailed analysis of what Replicator has been doing. Everything it executes is written with what result it gives.

This makes it fairly easy to debug in situations where it might seem hard to figure out what is causing the error.

On the following pages, is an example of a trace file. The information is very detailed and it is possible to see exactly what happens during a replication.

If there are problems with an installation and you wish to get help from your supplier, always generate a trace file you can parse on.

This will make it easier to solve the problem.

### Notice that

.....  
In the Replicator INI Editor within the tab “Miscellaneous”, you can set a maximum size (in bytes) for a Trace file (the default maximum size is 10 MB). The parameter for this setting is called “Text Log max size”. For further information, please see section 2.7.  
.....

Below is an example of how the beginning of a trace file can look.

Run with the command: `repnt g=customer t=trace.txt`

```

Version: Replicator for Microsoft Dynamics NAV - Release 4.21.17
before specdb.init - cmdfinancials = o
Connect: Before CreateDatabase.
Inito - just before call DBL_Init. subdirname='C:\Program Files\Data Backbone
Software\REPNT\CFG'
DBL_Init - just before call DBL_LoadModule. o,path='C:\Program Files\Data Backbone
Software\REPNT\CFG\cfront'
DBL_Init - after call DBL_LoadModule. o,path='C:\Program Files\Data Backbone
Software\REPNT\CFG\cfront'
Init - just after call DBL_Init - err=o.
Inito - after call DBL_Init.
Inito - after version check.
Inito - before setnavisionpath with 'C:\Program Files\Data Backbone Software\REPNT\CFG'
Inito - after load license.
NaviDatabase constructorod - subdirname = 'C:\Program Files\Data Backbone
Software\REPNT\CFG'
Connect: Before ConnectServerAndOpenDatabase.
Connect: Connected to server/database o HQ
License(License Information): expiredate=1199051939, now = 1174380713
DCDateTime(): DateTime Conversion: Mon DD YYYY Value: Feb 6 2007
DCDateTime(): Extracted: 6 2 2007
DCDateTime(): Extracted: <--NULL--> <--NULL--> <--NULL-->
createDatabaseListEx - building list.
NaviDatabase createTable 64823
NaviTable - constructor - end of Init - table = 64823d
NaviTable - destroy - table = 64823d
NaviTable - destroy - at end.o
NaviDatabase createTable 64823
NaviTable - constructor - end of Init - table = 64823d
createDatabaseListEx - check common: isAllEqual=1, countFirst=4, countSecond=0
NaviTable - destroy - table = 64823d
NaviTable - destroy - at end.o
createDatabaseListEx: There is 3 Servers and 1 SingleUserDBs defined in the configuration.
after Log init - ok.
after TextLog init - ok.
5-45-07020422
1 Server + 1 Laptop + LogChanges + Objects + Server + ChangesOnlySQL + NoActivatData Backbone
Software A/S - expires 31-12-2007
Data Backbone Software A/S - expires 31-12-2007
Transfer: at start.
NaviDatabase createTable 64822
NaviTable - constructor - end of Init - table = 64822d
Transfer: after find specification.
RunTransfer: at start.
SetupTransfer: Begin.
NaviDatabase createTable 64822
NaviTable - constructor - end of Init - table = 64822d
NaviDatabase createTable 64823
NaviTable - constructor - end of Init - table = 64823d
NaviDatabase createTable 64823
NaviTable - constructor - end of Init - table = 64823d
SetupTransfer: exchangetype is 1.
SetupTransfer: fieldtransfertype is 1.....

```

## A.2 TROUBLESHOOTING

This section contains troubleshooting solutions and suggests solutions to different error messages you might receive when running Replicator (error messages are noted with quotation marks).

**You are running Replicator with `G=Design` but nothing seems to happen.**

---

### Cause

This is most likely to occur either because you have not created any database records in the Replicator Setup Application telling Replicator where to find the databases to read design from, or because the database records have the Read Design field set to "No".

### Solution

- 1 Create database records for the actual databases.
- 2 Set Read Design to "Yes".

**Company lookup (using F6 in Company Name) does not show the companies.**

---

### Cause

This is because you have not transferred the design of the database into the setup database.

### Solution (1)

- 1 Specify the Company name manually.

### Solution (2)

- 1 Mark the field Read Design and run Replicator with `g=design`.

## You run the Scheduler via the item Automatic Scheduler but only Navision jobs are run

### Cause

If you selected the item “Automatic Scheduler” in order to run Scheduler jobs only Navision Scheduler jobs are executed. If you want to run Replicator Scheduler jobs you have to run Replicator from the Command Center or from a command line prompt with `g=scheduler`. That also means, when running the Scheduler this way (`g=scheduler`) you only run Scheduler jobs of the type Replicator.

### Solution

- 1 Run Replicator from the Command Center or with: `repnt g=scheduler`.

## What is the difference between the Replicator- and Automatic Scheduler?

The Replicator Scheduler can only run Specifications and the Automatic Scheduler can only run codeunits.

## You have started the Replicator Server but can not get a connection

### Solution

Check to see if you have specified the correct IP address and Port number of the Replicator Server. In either the database card or the Replicator configuration file.

## Insert fails when replicating from a Navision 3.56 or Financials server to an MS-SQL Server

### **Cause**

The values of the primary key that is used in the MS Dynamics NAV table placed on the MS-SQL Server, is sorted differently than they are within the Navision 3.56 or MS Dynamics NAV server.

### **Solution**

Within the requested Specification you set the field, Sequential Read, to either “source only” or “dest only” (if Delete is part of WhatToDo you set the field to “dest only”).

## The Replicator Scheduler’s next run date is increased by 2 years

### **Cause (1)**

The Interval disagree with the Start Time/End Time.

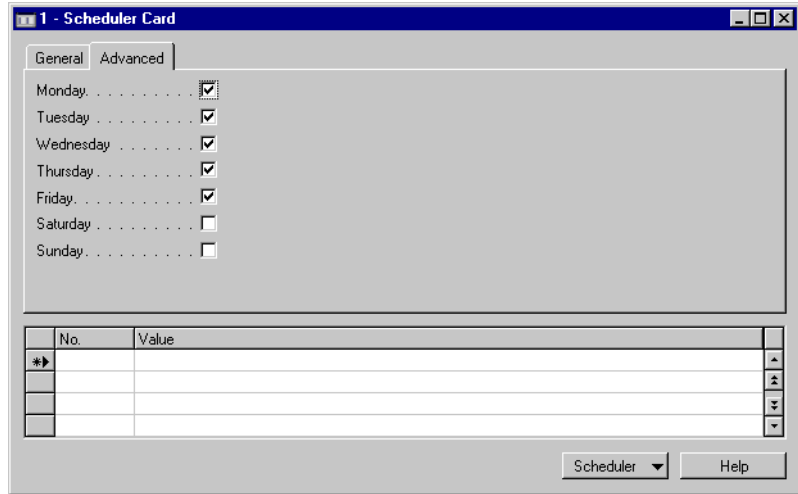
### **Solution (1)**

Try to blank the fields Start Time and End Time. If you need to specify these fields, make sure that they are in accordance with the field Interval and the fields Next Date/Next Time.

### **Cause (2)**

The week days under the tab advanced on the Scheduler card are not correctly marked.





**Solution (2)**

Make sure that the field Interval is in accordance with the specified days.

## A.3 ERROR MESSAGES

### “You have not selected a database”

---

#### Cause (1)

We have seen this error message in different situations:

If the MS Dynamics NAV license file (`fin.flf`) does not have C/Front access, you will get this error message from MS Dynamics NAV!

#### Solution

- 1 Ensure that you are using the correct `fin.flf` (with C/Front access) or contact your dealer to get the C/Front access.

#### Cause (2)

If you specified a local MS Dynamics NAV database and the file does not exist (because of wrong spelling or similar).

#### Solution

- 1 Ensure that you put the correct file name when specifying a local MS Dynamics NAV database.

### "Error 1 in module 47"

---

#### Cause


This MS Dynamics NAV error message will most likely be followed by a protection violation. It is most likely caused by running with MS Dynamics NAV files from different versions.

**Solution (1)**

- 1 Ensure that the file `fin.flf` has C/Front access.

**Solution (2)**

- 1 Ensure that you are using the same version of the MS Dynamics NAV files: `dbm.dll`, `slave.exe` and `cfront.dll`.

**“Company name does not exist”**  
**Cause**

If you know that the company exists the reason why you get this error message is most likely because the Company name is not specified correctly within the Database Card or the `replicat.ini` file. Remember that Company name is CASE SENSITIVE.

**Solution**

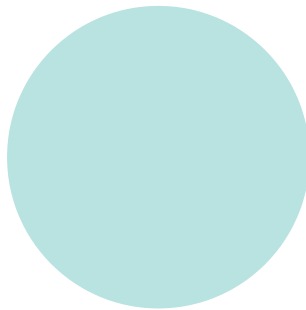
- 1 Check the Database Card and ensure that Company name is written exactly as it is (including small and capital letters).
- 2 Edit the file `replicat.ini` and ensure that Company name also here is written exactly as it is (including small and capital letters).

## Appendix A Troubleshooting and Error Messages

## **Appendix B**

### **Source Counter and Action code in MS Dynamics NAV 3.70 or later.**

This appendix contains examples of C/AL code that can be used with MS Dynamics NAV 3.70 or later to implement Source Counter and Action support in the MS Dynamics NAV application.



## **B.1 IMPLEMENTING SOURCE COUNTER AND ACTIONS**

Please review section 4.3 and 4.4 for a description of how Source Counter and Actions work and what the C/AL code in the Navision application should do.

In MS Dynamics NAV 3.70 and later the Record and Field Reference facilities enables us to effectively put most of the C/AL code needed for the Source Counter and Action facilities to work in one central place. We have implemented this code in codeunit 64825 Replicator Functions (please be sure to import the ReplicatorFunctions\_370.fob file).

To use the Source Counter you still need to create a BigInteger field and a key for this field in each table. Please be sure to give this new field number 64822 and name it "SourceCounter" as this is what we use in Codeunit 64825 to detect/find the Source Counter field.

## B.2 CALLING REPLICATOR FUNCTIONS DIRECTLY FROM TABLE TRIGGERS

This section show some examples on how to call the Replicator Functions codeunit from Table Triggers and Codeunit etc. where a specific table is modified.

For a given table, where you want to have the Source Counter and Actions working, you generally need to insert these calls in all places where the table is modified, inserted, deleted or renamed. This includes the OnInsert, OnModify, OnDelete and OnRename triggers on the table, but also all places in the code where MODIFY, INSERT, DELETE, MODIFYALL or DELETEALL is used on the table. Use a CrossReference Tool to find these places.

### EXAMPLE CODE:

Create the following three variables:

```
RecRef type RecordRef
```

```
xRecRef type RecordRef
```

```
ReplicatorFunctions type Codeunit ReplicatorFunctions
```

### Code for Insert:

```
RecRef.GETTABLE(Rec);
```

```
ReplicatorFunctions.OnInsert(RecRef);
```

### Code for Modify:

```
RecRef.GETTABLE(Rec);
```

```
xRecRef.GETTABLE(xRec);
```

```
ReplicatorFunctions.OnModify(RecRef, xRecRef);
```

### Code for Delete:

```
RecRef.GETTABLE(Rec);
```

```
ReplicatorFunctions.OnDelete(RecRef);
```

**Code for Rename:**

```
RecRef.GETTABLE(Rec);  
  
xRecRef.GETTABLE(xRec);  
  
ReplicatorFunctions.OnRename(RecRef, xRecRef);
```

For MODIFYALL and DELETEALL make loop that iterates through all the records and calls the above code.

In the above code the "Rec" and "xRec" referes to the record respective previous version of the record being modified, inserted, deleted.

**Please Note...**

.....  
The OnRename code only takes care of Renaming the current Record and not all the places where this record is referenced. This means that if it should work properly, you have to add code that changes all these places/records too. For a Customer table this is a lot of tables (all the tables where you find a customer number). It is generally safer to not use Rename for these tables. Add a line with ERROR('Rename is disabled.') to the OnRename trigger of the table.  
.....

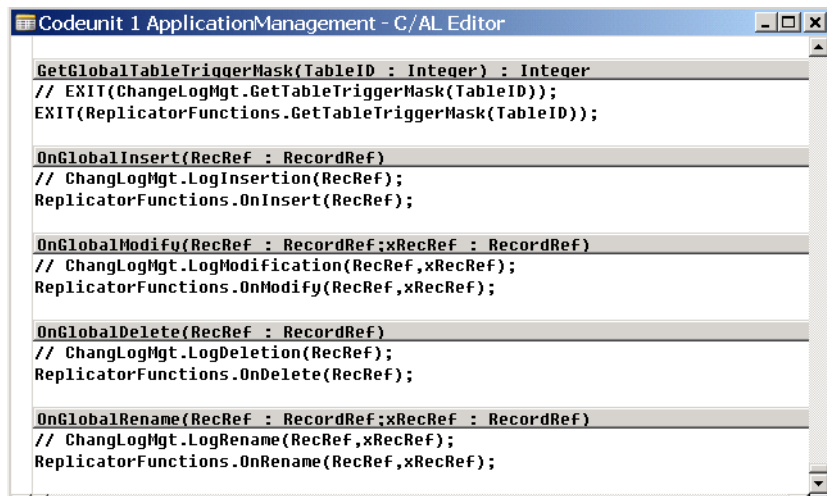


## B.3 INTEGRATING THE REPLICATOR CALLS INTO THE CHANGE LOG FACILITY IN NAVISION

MS Dynamics NAV version 3.70 and later offers a Change Log facility. This facility can (when enabled) be used to write all the changes made to a specific table to a Change Log table. The facility uses the OnGlobalModify, OnGlobalInsert, OnGlobalDelete and OnGlobalRename triggers defined in Codeunit 1. These triggers are called whenever a modification etc. is made to a table from the Navision User Interface. This is a very strong facility, but unfortunately it is not perfect. Only changes made from Forms will result in a call to the OnGlobalxxx triggers; A change made in C/AL code using the MODIFY, INSERT, DELETE etc. functions, does not call the OnGlobalxxx triggers.

But you can still use this facility to save a lot of code in relation to the Replicator. The code on each table in the OnRename, OnInsert, OnModify and OnDelete triggers can be saved.

To integrate the Replicator with the OnGlobalxxx facility, there are two ways to do this. You can simply replace the calls to the ChangeManagement codeunit, with call to the Replicator Functions codeunit.



```
Codeunit 1 ApplicationManagement - C/AL Editor

GetGlobalTableTriggerMask(TableID : Integer) : Integer
// EXIT(ChangeLogMgt.GetTableTriggerMask(TableID));
EXIT(ReplicatorFunctions.GetTableTriggerMask(TableID));

OnGlobalInsert(RecRef : RecordRef)
// ChangLogMgt.LogInsertion(RecRef);
ReplicatorFunctions.OnInsert(RecRef);

OnGlobalModify(RecRef : RecordRef;xRecRef : RecordRef)
// ChangLogMgt.LogModification(RecRef,xRecRef);
ReplicatorFunctions.OnModify(RecRef,xRecRef);

OnGlobalDelete(RecRef : RecordRef)
// ChangLogMgt.LogDeletion(RecRef);
ReplicatorFunctions.OnDelete(RecRef);

OnGlobalRename(RecRef : RecordRef;xRecRef : RecordRef)
// ChangLogMgt.LogRename(RecRef,xRecRef);
ReplicatorFunctions.OnRename(RecRef,xRecRef);
```

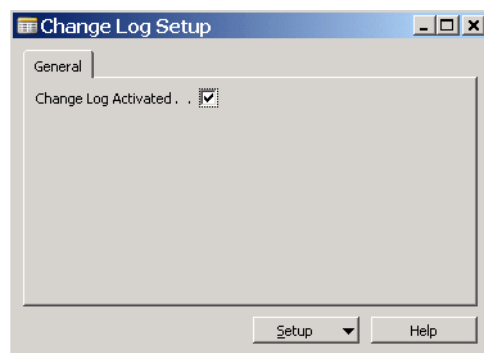
If using this option you must remember to edit the Codeunit 64825 function GetTableTrigger() to return 15 for each table where the code should be active.

If you want to have the Change Log facility active together with the Replicator or if you want to use the Change Log Management feature to setup for which tables the code should be active, you can integrate the calls to the Replicator into the Change Log Management codeunit (codeunit 423).

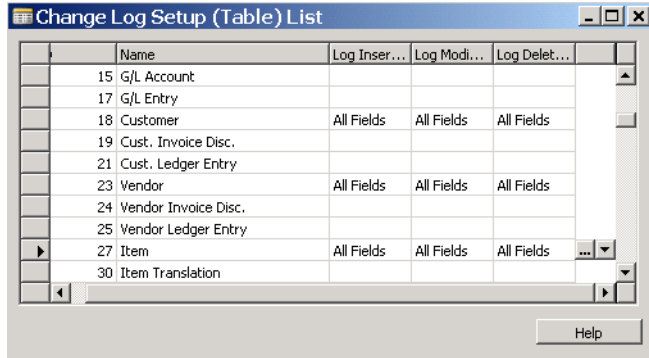
If you do not want the Change Log active, simply comment out the existing code in the LogInsertion, LogModification, LogRename and LogDeletion functions and add the respective calls to the ReplicatorFunctions codeunit.

The GetTableTriggerMask function is called for every change made and returns a bit encoded value to indicate which of the OnGlobalxxx functions in Codeunit 1 should be called for this specific table. If 15 is returned, all of the OnGlobalxxx functions are enabled (which should normally be the case for the Replicator as we want our code called on both Insert, Modify, Delete and Rename).

If you want to use the Change Log Management to setup which tables should be active/called with the SourceCounter code, leave the calls to Codeunit 423 in Codeunit 1 and make the changes in Codeunit 423 (change the LogInsertion, LogModification, LogRename and LogDeletion to make the respective calls to the Replicatorfunctions codeunit). Then to activate the tables for the Replicator, Activate the Change Log facility (from the Main Menu, choose "General Ledger", select "Setup" and choose "Change Log Setup") and for each table to activate, choose the "All Fields" option in "Log Insertion", "Log Modification" and "Log Deletion".



### B.3 Integrating the Replicator calls into the Change Log Facility in Navision



	Name	Log Inser...	Log Modi...	Log Delet...	
	15 G/L Account				
	17 G/L Entry				
	18 Customer	All Fields	All Fields	All Fields	
	19 Cust. Invoice Disc.				
	21 Cust. Ledger Entry				
	23 Vendor	All Fields	All Fields	All Fields	
	24 Vendor Invoice Disc.				
	25 Vendor Ledger Entry				
	27 Item	All Fields	All Fields	All Fields	...
	30 Item Translation				

Help

**Appendix B** Source Counter and Action code in MS Dynamics NAV 3.70 or later.

## Appendix C

### New Features from version to version

This appendix describes the new features build into Replicator program from version to version.

This appendix contains:

- Initial version of Replicator – version 1.00.
- Version 1.50 of Replicator.
- Version 1.51 of Replicator.
- Version 1.52 of Replicator.
- Version 1.60 of Replicator.
- Version 2.00 of Replicator.
- Version 3.00 of Replicator.
- Version 4.00 of Replicator.
- Version 4.10 of Replicator.
- Version 4.20 of Replicator.
- Version 4.22 of Replicator.
- Version 4.30 of Replicator.

## **C.1 INITIAL VERSION 1.00 OF REPLICATOR (RELEASED NOVEMBER 1996)**

The initial version of Replicator.

## C.2 VERSION 1.50 OF REPLICATOR (RELEASED MARCH 1997)

From version 1.00 to version 1.50 of Replicator, the following changes were made:

- A version 1.04 was released with minor changes and corrections.
- Source Counter: It is now possible to have several destination databases replicate the same table by only creating one field on this table.
- Sub Specifications: With this facility it is now possible to link one or more Specifications to a main Specification.
- Tags enable you to specify variables in Specifications and then define what they mean on the command line prompt of Replicator.
- The ToDo table now supports "Private" records which is a way to tell Replicator not to replicate those ToDo records before the Navision application is done processing it.
- Specifications now have the option to have "Source Design" and "Dest. Design". This way you can tell Replicator from which database it should read the design when creating a Specification but still have a different "Source Database" and "Dest. Database". This is useful if the source or destination database design is not available. This could be the case with for example, databases on a salesman computer.
- Better error handling is built into Replicator. Navision toolkit errors are now handled more gracefully and logged to the setup database if possible.
- Replicator has been verified to run under Windows 95, but we still only guarantee that it runs under OS/2 Warp and Windows NT.
- The code handling import and export of Specifications from the setup database to a file has been totally rewritten, exports from version 1.00 and 1.04 are not supported. The new format of the export is written so that the later versions of Replicator will be able to import them.
- Logic of the Flag Field has changed slightly to handle if a source and destination database would come out of synchronisation. If the source

database would clear the Source flag but there were no actual changes on the record, Replicator would continue to replicate this record each time until an actual change was made on the record. Now Replicator updates the source flag each time it is handling an update, so the synchronisation error made by the application only will affect one replication.



## C.3 VERSION 1.51 OF REPLICATOR (RELEASED MAY 1997)

From version 1.50 to version 1.51 of Replicator, the following changes were made:

- **Source Counter:** New features have been added to the Source Counter facility. It is now possible to tell Replicator that it should update the destination database Source Counter so that changes from source to dest will be forwarded to other databases when they replicate with the destination. If the source has been recently updated with the destination, the changes the source makes in the destination will not be returned when a replication is run the other way. This also improves performance. It is possible to override so that changes are not sent back to the source if this for some reason is wished.
- **Log of changes:** It is now possible to have Replicator log the changes that has been made to a given record. Changes will be logged in the Replicator Log with TableNo, TableName, FieldNo, FieldName, OldValue, NewValue and if a UserID is available to show who changed it, is logged as well.
- **Block Specifications:** The requirement that a Sub Specification MUST have a record link to the Main Specification has been removed. This means that you can create several Sub Specifications in a block and assure that all these Specifications will be committed in one transfer. Replicator will commit data after each Main Specification, but not after each Sub Specification.
- **ToDo records** can now be sent to a given destination through another database. When you specify ToDo transfers, you should use the central database as Source Database and the de-central database or salesman database as Destination database.

## C.4 VERSION 1.52 OF REPLICATOR (RELEASED JUNE 1997)

The following is a list of changes from version 1.51 to 1.52:

- **Actions:** Replicator now supports Actions. Actions can be used to dictate to Replicator what it should do in a given replication. You specify the table number of data to work with, specify the primary key values, and tell Replicator if it should Update, Add or delete these records. Using Actions you can control exactly what Replicator will be doing. It is also possible to use wildcards (\*) in the specification of the key.
- **Source Counter update error is corrected.** If the commit of the destination database would fail for any given reason, the Source Counter would in rare occasions still be written to the log. No fatal data error was happening. However, Replicator would think that some records was transferred when they were actually not. The Source Counter is now only updated when all commits have been returned successfully.
- **Trap error is corrected.** Under WindowsNT using Navision Financials, Replicator would stop with a trap error. All data would have been transferred correctly. However, the error occurred when the Replicator program was about to be exited. This has been fixed.
- **Logging of Add/Delete:** The logging of changed data has been expanded to include Add and Delete. Now it also requires additional rights in the license file to use Log Changes.
- **Replicator now works with the new version of C/Front 1.20.**
- **Transfer of Navision Financials objects:** Replicator now supports replication of objects in Navision Financials. This requires additional rights in the license file.

## C.5 VERSION 1.60 OF REPLICATOR (RELEASED SEPTEMBER 1997)

The following is a list of changes from version 1.52 to 1.60:

- Several enhancements have been made on transfers between Navision 3.56 and Navision Financials. It is now possible to transfer Navision 3.56 integers to and from Navision Financials integers even though there is a size difference. If a number transferred from Navision Financials to Navision 3.56 is too big, Replicator will stop with an error. Option, Dates and Yes/No fields are now exchangeable and size of the fields are handled.
- A code update error when replicating from Navision to Financials has been corrected.
- When data is read from the database, verification of data is now done on the same level as Navision and Navision Financials does when making a dbtest=max of the database.
- Source Counter would not get updated in the log when using it on Sub Specifications. This has been corrected so Source Counter now works as expected on Sub Specifications.
- When more than max Sub Specifications was reached, Replicator failed with a wrong error message.
- The allowable number of fields in a Specification field-list has been raised from 150 to 256.
- Writing to the log in the setup database has been optimized.
- A new transfer facility called "Backup" has been added. This transfer mode can be used to keep a backup server (an extra Navision server) up-to-date with all changes made in the primary Navision server.
- The cache settings on local databases have been raised from 100KB to 1000KB.
- To give you an indication on Replicator progress, a dot "." is written to the screen for each 100 records read by Replicator.

## C.6 VERSION 2.00 OF REPLICATOR (RELEASED OCTOBER 1998)

The following is a list of changes from version 1.60 to 2.00:

- Replicator is adapted to work with Navision Financials 1.30 and 2.0.
- Scheduler: A new facility of Replicator is the Scheduler. Here you can create Scheduler jobs which can run Specifications or Groups of Specifications at a certain time. You can also create a Scheduler job calling Navision Financials codeunits to be run at a certain time. Scheduler works with Navision 3.56 too.
- Automatic Scheduler: Now you can run Navision Financials codeunits automatically by starting the Automatic Scheduler. You set up rules for Automatic Scheduler in the tab "Scheduler" resident in the Replicator Setup menu.
- Directory: Directory is a new field added to the Database Card. Here you can specify which subdirectory the "database" should get its dbl/cfront dlls from. This field is only to be specified if what you filled in for the field Code should differ from the subdirectory name.
- Replicator Setup: This is a new feature where you can specify what kind of numbering your Specifications and Scheduler jobs should go by and you can set up rules for the Automatic Scheduler. You can also fill in the Code of your local database and the central database as general information for you.
- Commit per: Entering a number in this new field Replicator will only transfer this many records, then commit and stop the transfer. This facility is useful when using slow and unstable modem lines for communications. Commit per can be used on all transfer types except ToDo.
- Reports: Using Reports you can print Replicator Specifications and a Replicator Scheduler List.
- Running Replicator: Now logout of source and destination database is not done until a third database is used. This results in less overhead on running several Specifications after each other; especially on slow connections.

- **Actions:** There is a new option available in the field WhatToDo; Update-Add. This means that if a given record exists in the destination database it will be updated and if the record does not exist it will be added.  
Move Actions is a new field that gives you the possibility to move the Action table when replicating.  
The Action table has been optimized so that the source table and destination table only opens if there are any Actions to perform.
- **Backup Facility:** Backup replication with several companies is now supported. When running Backup transfer with Company set to "\*" the Company name will be written in the Activity Register and Change Register. This ensures correct logging of Source Counter per company. A new BackupCompare transfer type has been added. Replicator will run through all sub-tables and compare source and destination databases writing in the Activity Register how many records should be inserted, modified or deleted for the source and destination to be equal. In Compare, it will ignore the Source Counter field and if the field, Log Changes, is enabled, data will be written to the Change Register with UserID as "COMPARE".
- **Field List Type:** Now field lists transferring All Fields are build from fields existing in both source and destination (excluding the Source Counter field). Before only source was run through and fields should exist in the destination.  
A new type; Exclude List; has been implemented. Choosing this type in a Specification transfer, Replicator will exclude the fields that has been specified in the Field List.
- **Dest. Update SC:** When activating this facility the destination Source Counter is now updated even if the records are the same (i.e. value for every field on a table is replicated). This is done to ensure that changes in fields not replicated by this replication, still will be transferred back/out to other databases.
- **Account:** Account has been renamed as Company. This means that C=<Company> is now supported on the command line prompt. However "A=" can still be used.

- **Activity Register:** log informations are now placed in the Activity Register. A new command line parameter has been created; L=MIN. Using this parameter, logs only minimum of information (useful with Backup server).
- **Change Register:** Changes that occur to data when replicating is now placed in the Change Register.
- **Local database cache:** Local database cache settings have been moved to `replicat.cfg`.

## C.7 VERSION 3.00 OF REPLICATOR (RELEASED MARCH 2000)

The following is a list of changes from version 2.00 to 3.00:

- Replicator is adapted to also work with Navision Financials 2.01 and 2.50.
- Replicator Server: By using the Replicator Server facility you will be able to reduce the total transfer time noticeably when using mobile phones or internet. Only necessary data is transferred and data is compressed during the transfer.
- MS-SQL Server: Now you have the possibility of transferring data to/from Navision Financials databases hosted by an MS-SQL Server 7.0.
- CompanyImport and CompanyExport:  
With these two transfer modes you will be able to transfer a specific Company from the main database to a laptop and assure that nobody else will be able to edit the Company on the main database while having it on the laptop until you have transferred it back with all the new changes.
- Database Card: Two new fields have been added to the Database Card, “Database Driver” and “Use NT Authentication”. A new tab, Remote Server, has also been added to the Database Card.  
The value of the field Database Driver is by default set to “NDBCN” and only if you transfer to/from a database hosted by an MS-SQL Server the field is set to “NDBCS” (this field has also been added as a parameter within the `replicat.cfg` file).  
The field Use NT Authentication can be used if the database you want to transfer data to/from is accessed with the same UserID and Password as when logging on your Windows NT platform (this field has also been added as a parameter within the `replicat.cfg` file).  
The new tab, Remote Server, is used with the facility Replicator Server.
- Specification List: A new field has been added to the Specification List, “Sub Specifications”. If this field is marked it indicates that the main Specification contains Sub Specifications.
- Specification Card: Three new fields have been added to the tab “Advanced”: Sub Specifications, Field List and Table-Linking. If the field Sub Specification is marked it indicates that the main Specification

contains Sub Specifications. If Field List is marked it indicates that the fields have been specified within the Field List. If Table-Linking is marked it indicates that a link has been specified.

- Sub-Tables: A new field has been added to the Sub-Table List, “Dest. Table No.”.
- `replicat.cfg`: Six new parameters have been added to the configuration file. These are: Navision Database Driver (explained under “Database Card”), Navision Use NT Authentication (explained under “Database Card”), Text Log File name, Text Log level, Remote Server Address and Remote Server Port.  
Text Log File is by default set to `Replicat.Log` and the Text Log level is by default set to 1. They are used in order to generate a separate log file. When running entries that include updating of the Source Counter and errors occur, the error messages will be logged to this file instead of the Activity Register so that it won't affect the numbering of the Source Counter within the Activity Register.  
Remote Replicator Server Address and Remote Replicator Server Port are used with the Replicator Server facility.
- Command line parameters: Two new command line parameters have been added: `serveronport=<the port number to be used for the Replicator Server>` is used with the Replicator Server facility and `L=NONE` so that Replicator only logs SourceCounter information to the Activity Register.
- Backup facility: A new Transfer Type called BackupCompare has been enabled. Using this Transfer Type you can make a comparison of the tables in your source database with your destination database. Specify tables in the Sub-Table List (just as with Transfer Type=Backup) and Replicator will compare and write the differences in the Activity Register and Change Register (if enabled). This facility does a full compare of the tables (like Update-Add-Delete but without changing anything) – it ignores the SourceCounter field if this is specified.
- TODO and ACTIONS: Fixed error when running TODO or Actions with a Navision Financials database.



- Export and Import facilities: With the Replicator Setup Application 2.0, the Export and Import facilities did not export/import all the necessary tables. Only the "Specification" and the "Spec. Fields" tables were exported/imported.

Now the Export will export the following tables: "Specification", "Spec. - Fields", "Field Filter", "Linked Table Filter", "Database", "Group", "Scheduler", "Scheduler Tag" and "Replicator Setup".

The Import will import all the above tables, if run without specifying a group (omit the G= parameter).

If run with specifying a group, only Specification related tables ("Specification", "Spec. Fields", "Field Filter", "Linked Table Filter") will be imported (and then of course only the Specifications belonging to that group).

The Import accepts partial imports – i.e. if a Specification already exists in the database, the import will write a warning, but still continue the import. The import can still import "old" files – but in this case you have to add Filters and Table-link filter after the import.

Furthermore, The Import and Export features now write statistical information (how many records imported/exported per table) to the screen and to the Activity Register.

- Activity Register: The field Text has been enlarged to 250 character to avoid some error messages. The fields: "Specification No.", "Source Database" and "Dest. Database" have been updated with correct Table links to avoid some problems after renaming Specifications or databases. We have included a new codeunit that can be used to cleanup the Activity Register without damaging the SourceCounter. To run it, enter the item Periodic Activities and press Clear Activity Register.
- Actions: Two new fields "Dest. Check SC. No." and "Dest. Check SC. Name" have been added to the tab "Actions" within the Specification Card. By specifying "Dest. Check SC. No." (the Source Counter field number of the destination table) Replicator will check that it does not delete the record with the largest Source Counter number in the destination table (if it did, it would break the SourceCounter logic in the destination table). This is only important if you are using Actions to delete records and you are replicating in both directions (backup server implementation are not affected by this problem).

The field “Move Action” has been added to the Actions form, so that when entering Actions from the Replicator menu, “Move Actions” is now shown. Move Actions is enabled by marking Move Actions within the Specification Card (the tab “Actions”) plus marking Move Actions within the Actions table so that only the entries that are marked will be moved.

- Sub Specifications: The Create Sub Specifications button in the Sub-Table List now recognizes both "Source Counter" and "SourceCounter" as the field name for the Source Counter field.
- Automatic Navision Scheduler: When starting the Automatic Navision Scheduler, it now asks if it should ignore the "Running" flag (if it is set). To avoid trouble in different language versions of Navision Financials due to different chars used for Day (D) and Month (M), we have included two extra fields in the tab “Scheduler” within Replicator Setup: "Calcddate Day char" and "Calcddate Month char". Please fill in these fields according to your language version of Navision Financials.
- Replicator Setup: The tab “Scheduler” has been renamed to “Navision Scheduler” and a new tab has been added, “Replicator Scheduler”. Here you can specify what date and time you want the Scheduler concerning Replicator Scheduler jobs should be shut down.
- Replicator Application Objects: The main menu form (form 330) has been removed from our objects to avoid overwriting a custom or non English main menu.  
A new table has been added, Last SourceCounter numbers. If the last record in a table is deleted and the record contains a Source Counter number, the Source Counter number will be stored in this table instead. This also means that the Source Counter Code now takes this in to account.
- Error regarding positioning on the correct Specification/Scheduler Entry/ Database when using Shift-F5 has been corrected.
- Replicator now allows use of dates up to and including 31-12-9999.

## C.8 VERSION 4.00 OF REPLICATOR (RELEASED JUNE 2001)

The following is a list of changes from version 3.00 to 4.00.

- Replicator is adapted to work with Navision Financials 2.60d.
- Rep-nt has been renamed to Repnt.
- Installation Program: The Replicator files are now installed automatically through an installation program.
- Replicator Command Center: An application where you can run Replicator related tasks such as running Specifications, Scheduler jobs of the type Replicator or start a Replicator Server. The Replicator Command Center is an alternative to running Replicator from the command line prompt. For more information please refer to the Command Center Guide 1.00.
- Service Manager: You can run certain Replicator tasks unattended as Services (NT Services) from the Service Manager application.
- Replicator Server: The Replicator Server has been optimized for better performance.

You can now have several clients connecting at the same time. All clients share the same connection to the server for reading configuration and writing to the Activity register.

Three new settings have been added (these are specified within the replicat.ini file. See the description of "replicat.cfg"):

"Write statistics to console", "TCPIP Idle timeout (minutes)" and "Max Concurrent Clients".

"Write statistics to console": The statistics written to console includes the table number of the data being written, as well as how many records are send. In this way you can follow how well your setup is performing.

"TCPIP Idle timeout (minutes)": A timeout has been introduced on the Replicator Server. This allows the Replicator Server to detect an idle connection and kill that idle connection. If the connection breaks during a replication because the TCPIP Idle timeout runs out, Replicator will re-establish the connection again so that the replication can proceed.

"Max Concurrent Clients": Here you can specify the maximum number of concurrent clients allowed to connect to the Replicator Server.

A new field "Buffer Size (Records)" has been added to the Specification

Card to control how many records are packed into one package before it is send to the Replicator Server. This allows you to fine tune the performance of the Replicator Server communication.

- `replicat.cfg`: The file `replicat.cfg` has been renamed to `replicat.ini`.  
The file can now be edited by using the “Replicator INI Editor” application. In the file `replicat.ini` the lines are not numbered anymore. Some of the parameters have been renamed and moved:  
“Max trace file size” = “Text log max size”.  
Line 007 (Local database cache size (KB) = Local Db. Cache  
Line 008 Local database commit cache = Local Db. Commit Cache  
Line 010 (Navision (0=3.56, 1=Financials) = Type  
Line 010 (Navision Server number (3.5x) = Server No.  
Line 012 (Navision Server name (Fin.)) = Server Name  
Line 013 (Navision nettype (NETB, TCP) = NetType  
Line 014 (Navision Database path & name) = Database Name  
Line 015 (Navision Account name) = Company  
Line 016 (Navision Username) = UserId  
Line 017 (Navision Password) = Password  
Line 018 (Navision Database Driver (NDBCN) = Database Driver  
Line 019 (Navision Use NT Authentication) = Use NT Authentication  
A“Installation Path”: Here you specify the path to your Navision 3.56 or Navision Financials Client depending on which type of database contains the Replicator Setup Information.
- The Activity register:  
Entries in the Activity register is written in one transaction (at the end of the transfer). SourceCounter entries are handled separately, so that if an error occurs the SourceCounter is not written to the Activity register. The Activity register window is now write protected.
- Specification Card:  
Error regarding selecting a Source Table when setting up a Specification has been corrected. If you select a Source Table in the destination database that does exist, the destination table will be left empty. A new field has been added to the Specification Card, “Buffer Size (Records)”.

- `replicat.uk`: Several messages and error messages have been moved to the text messages file name `replicat.uk` to allow translation of all program messages
- Database Card: Four new fields have been added to the Database Card, “Local Db. Cache”, “Local Db. Commit Cache”, “Use Codeunits Permissions” and “Installation Path”.
  - “Local Db. Cache”: If the database is a local database you can specify a size for cache settings. For further information about Cache, you can refer to the on-line Navision Financials help under the Contents subject “Dictionary”.  
If the database is a local database you can specify a size for commit cache settings. For further information about Commit Cache, you can refer to the on-line Navision Financials help under the Contents subject “Dictionary”.
  - “Use Codeunits Permissions”: With Navision Financials 2.60d or later, it is now possible to write into the write protected tables in Navision Financials. The additional rights are setup in a codeunit (as permissions for the codeunit) and the number of the codeunit must then be specified in the Database Card field “Use Codeunits Permissions” in the Replicator Setup Application.
  - “Installation Path”: Here you specify the path to the main directory of your Navision 3.56 or Navision Financials Client. Each time access to the Navision database is needed, the files required to access that database will be copied from the place you specified in “Installation Path” to a directory created under the Replicator main directory.
  - “Db. Path and Name” has been renamed to: “Database Name”.

## C.9 VERSION 4.10 OF REPLICATOR (RELEASED FEBRUARY 2002)

The following is a list of changes from version 4.00 to 4.10.

- Navision Attain is now fully supported.
- The data types DateFormula, Binary and TableFilter are now supported.
- The “Commit Per” facility has changed: Now the Replicator continues to transfer data after the commit, so that all data are transferred (but a commit is made for each x records read (before the data transfer was stopped after the commit)).
- The Replicator Server has been optimized when using Actions in the following way:
  - Using Actions
  - Source db is not using Replicator Server
  - Destination db is using Replicator server
  - Source & Dest table is entered in the Specification
  - Not using "Log all changes"
- The move actions facility is also optimized.
- Now it is possible to set the L=MIN parameter (for logging a minimum of information to the Activity Log in Navision) when running as Service: Add a "Log Level" key with value "2" (text) in the Replicator service entry in the registry.
- An error in ToDo replication was fixed (the SourceDatabase was not filtered correctly, so too many records were transferred).
- Fixed an error with Replicator Server when running with Sequential Read = "Source+Dest".
- The Replicator Ini editor (Repini.exe) now correctly checks if the Replicat.ini file is missing or write-protected before trying to read/update it.
- A new file - ReplMenu.fob ver.4.01 - has been included which is a menu adjusted for Attain. The file must be imported after the file Rep.fob.

- Application:  
The following code fields have been enlarged from code 10 to code 20  
Specification No.  
Group Code  
Database Code  
Scheduler No.

## C.10 VERSION 4.20 OF REPLICATOR (RELEASED APRIL 2004)

The following is a list of changes from version 4.10 to 4.20.

- Renamed from “Replicator for Navision Attain/Financials” to “Replicator for MBS-Navision”.
- We now have full support for Navision Attain 3.60 and MBS-Navision 3.70 (including support for new field types introduced in version 3.60)
- It is possible to use a new parameter from the Command Line Prompt regarding the Replicator Server. The parameter is “ShutDownTime=hh:mm” which makes it possible to shutdown the Replicator Server at a specific time.
- “Sub-Table” has been renamed to “Sub-Specifications”.
- A new .fob file has been added: ReplicatorFunctions\_370.fob. For use with MBS-Navision 3.70 or later a new implementation of Source Counter and Actions have been made. This new implementation reduces the amount of code to implement the Source Counter and Action features dramatically. See Appendix B for a description of this.
- CRONUS company names are now correctly recognized as Navision Demo company (and will work with a Demo version of Replicator).
- Error messages:  
If using the Replicator Server and connecting with a Replicator Client with a different version, the server came with a correct error message, but the client was just hanging.  
This has been fixed so that the error now get correctly back to the client and is displayed here.  
The error message has also been changed to be more informative.
- Fixed error in Scheduler.  
The Replicator Scheduler could change the "Next Time to run" in a wrong way if using day or week as unit and if the calculation had to pass over the summer time/winter time change. This problem is now fixed so that the Next Time to run is calculated correctly in any case.



- Fixed problem with DestUpdateSC via ReplicatorServer (we were setting strange values in a FlowFilter field that should be set to blank).
- Fixed error with replication of field type TableFilter in table "User Rights".
- Now first line of Log is committed before the transfer of data begins, so that you can see in the Log that the transfer is started.
- Fixed error in Replicator Server so that fields are not calculated when design (emptyrecord) is read by the server.

## C.11 VERSION 4.22 OF REPLICATOR (RELEASED MARCH 2007)

The following is a list of changes from version 4.20 to 4.22.

- Renamed from “Replicator for MBS-Navision” to “Replicator for Microsoft Dynamics NAV”.
- We now support Microsoft Dynamics NAV 4.0, 4.0 SP1 , 4.0 SP2 and 4.0 SP3.
- ChangesOnly (from SQL):  
This new facility will allow you to transfer only the records that have been changed since last replication, but without having to implement any C/AL code or add any fields in MS Dynamics NAV. This facility work in the same way as the existing “Source Counter” facility, but without the need to add an extra field and code to the table in question.  
The facility requires that the Source database is MS Dynamics NAV on SQL Server or MS Dynamics NAV on MS SQL Express (the SQL single user database).

A new field called “Changes Only (from SQL)” has been added to the Specification Card on the “Source Counter” tab in the Replicator Setup Application.

When this field is enabled, the Replicator will work in SourceCounter mode and it will use a timestamp field in SQL to retrieve only the records changed since last replication. The highest transferred timestamp will be saved in the Activity Log, just as with the normal Source Counter Facility.

As with the existing “Source Counter” facility, only Inserts and Modifications can be detected with the “Changes Only” facility. Deletion of records can be handled by the “Actions” facility.

This new facility is also supported by the Replicator Server, so that the Source Database used can be accessed via the Replicator Server. The Replicator Server will handle the Reading of data in an optimized way and only deliver the records back that have been changed since last replication.

- **New Command:**  
A new Test connection command has been created. The Test connection command is used with repnt.exe. The Test connection command tests the connection to a database/server.  
`repnt test=<database code>`
- **New field on Activity Register:**  
A new field has been added on the Activity Register: “Scheduler No.”. When the Replicator is running as Scheduler, the “Scheduler No.” for the running Scheduler card is shown in the Activity Register. This way you can see what is running and when it is running.
- **Renamed:**  
“Register” on the specification list has been renamed to “Activity Register”.
- **“Change Register” added:**  
“Change Register” has been added to the specification list. If you select “Change Register” from the pull-down menu you enter the Change Register window.
- **New feature:**  
The Replicator Server now accepts a few simple commands. “ESC” or “Q” will quit the Replicator Server (it is not necessary to press “Ctrl-C” any more).  
“S” will show statistics on the console, including information on any active connections.
- **New feature:**  
The Source Counter field can now be a BigInteger type field. This enables use of large values for Source Counter.  
PLEASE NOTE that you have to change the fieldtype of the SourceCounter field in the Activity Register to BigInteger to use this facility.

- **New feature:**  
When specifying a filter value for a boolean field in the Setup Application, the Replicator translated a 1 or 0 to the corresponding “Yes” or “No” (in the language selected on the Navision client computer). Now it is supported that 1 or 0 is specified and the value is not changed, which makes it easier to specify these filters in a Multi-language environment. This is implemented for both Normal filter values and for Table Link filters.
- **New feature:**  
Support has been added for using Windows Authentication with SQL Server.
- **Changed functionality:**  
SQL\_TXN\_Isolation level is by default set to Read\_Committed when using the “Changes Only (from SQL)” facility (before it was Read\_Uncommitted). This means that when using “ChangesOnly (SQL)” it will only read records that has been committed on the SQL Server.
- **Changed functionality:**  
Delete Actions now use DeleteAll and it get statistics on how many records has been deleted by making a ReCount before DeleteAll (does not work when using LogChanges)
- **Fixed error:**  
The Replicator Server could not update records if the key contained “”. This has been fixed.
- **Fixed error:**  
Renaming a scheduler job did not rename the Tag records. This has been fixed.
- **Navision “License Expires” message stopped replication until manual press of the “OK” button. Now this message is ignored so that replication continues.**
- **ReadSCFromSQL with Replicator Server has been optimized so that it can use optimized UpdateAdd when writing to the Replicator Server.**

- Bugfixes:

License Check: Could not find any databases if 2 Accounts with no Replicator Setup were placed before the Account used to hold the Replicator configuration data. This resulted in a “could not find database using unique name or dbcode” error message.

Replicator Server ShutDownTime: Closed right away and set shutdown date to 1970. This has now been fixed so it uses the shutdowntime and date specified.

Service Manager: Before you were allowed to install a second service using the same repnt.exe, but the service could not run. Now we issue an error message when trying to install the second service.

Service Manager: Could sometime hang when stopping, and had to be killed in the task manager. This has now been fixed.

## C.12 VERSION 4.30 OF REPLICATOR (RELEASED JULY 2009)

The following is a list of changes from version 4.22 to 4.30.

- We now support Microsoft Dynamics NAV 5.0, 5.0 SP1 and 2009.
- Object Replication without limitation:  
In C/Front for MS Dynamics NAV 5.0 SP1, Microsoft has introduced a new functionality that handles import and export of Objects in the same way as it is done in the MS Dynamics NAV Client. This means that if you are using MS Dynamics NAV 5.0 SP1 or later, all updated or new created objects can be transferred regardless of your MS Dynamics NAV licence.
- Improved Object Replication performance:  
Before all objects were sent to the Replicator Server which compared and updated the objects in the destination.  
This has been changed.  
Now each object is checked for any differences and only if the fields are different, Replicator will send the new objects to the destination. This results in less data being sent, which improves the performance of Object replication.  
If using Navision on SQL, the Object Replication can be used with the “Changes only SQL” feature and hence only the changed/new objects are transferred. This dramatically reduces the time used for Object Replication.
- New feature/fixed error:  
Log Changes: When running ChangeLog on tables with many changes you would get a “Memory allocation error (in componentList grow)” when the computer runs out of memory. Or “An Unspecified error was found during replication!”  
Now max 10000 changed records are cached at a time which eliminates these errors.

The cache size can be adjusted in the Replicat.ini file with the line:  
Changes Log max cache: : <number of records>

When running as a Service the default value can be changed in the Registry

- New feature:  
Passwords in registry or in ini file can now be encrypted (disabled by default).
- New feature/fixes error:  
The Scheduler fields Last Date/Last Time were previously updated also if the schedule failed.  
This has been changed so that the Last Date/Last Time fields are only updated if the schedule was completed successfully.  
This means that now the fields Last Date/Last Time indicates the last time the schedule was run successfully
- New feature:  
The Scheduler fields “Start time” and “End time” can now be used to specify an interval passing midnight. If you specify e.g. Start time as 21:00 and End time as 03:00 the schedules will run between 9 p.m. and 3 a.m.
- New feature:  
It's now possible to select the highest Table No. that Replicator should read design on. By default Replicator reads Design on all Tables.
- New feature:  
In the Setup Application, the Source Counter Field has been changed to the type BigInteger. This means that you do not have to change the fieldtype of the Source Counter field in the Activity Register.’
- Changed functionality:  
Datatypes on some integer fields in the Configuration Tables have been changed from Integer to BigInteger:
 

64826 ToDo:	Field2	Entry No.
64827 Activity Register	Field1	Entry No.
	Field 8	Source Counter.
64832 Action:	Field 1	Entry No.
	Field 5	Source Counter.
64838 Change Register:	Field 1	Entry No.
64840 Last SourceCounter Numbers:	Field 2	Last SourceCounter.

PLEASE NOTE: Replicator v. 4.30 is still able to run on v. 4.22 Configuration Objects.

- Changed functionality:  
“Compare” has been changed to use cfront Text database compare function for Navision 4.0 or later.  
This improves the way Specifications with Sequential Read=Source+Dest. are running, and avoids the Error "Navision Error on InsertRec".
- Changed functionality:  
Error handling has been revised to improve Replicator stability to make Error responses better.
- Fixed error:  
When Errortype in Scheduler was set to “skip”, the time was sometime moved forward twice. This has been fixed.
- Fixed error:  
An error in Scheduler caused it to freeze/hang when running as a Service. This has been fixed.
- Fixed error:  
SourceCounter from SQL - SQLChangesOnly now uses correct filter to limit on timestamp values > Integer value limit.  
Before it used datatype Integer which caused it to return negative values when the SQL timestamp exceeded integer range.
- Fixed error:  
Some issues in the communication between the central repnt.exe and the remote Replicator Server could cause a specification to error or to freeze/hang. This has been fixed.
- Fixed error:  
Previously the Replicator server compared the Blob field itself by Object Replication. This caused the insertion of the Blob Size field in the exclude list not to work like intended.  
Now the Blob reference field is no longer compared.  
If e.g. 2 objects are 100% identical except for the Blob size field and this field is in the exclude list, the Replicator Server will not try to update the object as it did earlier.



- Fixed error:  
When a connection was made through the Replicator Server, Replicator was not able to replicate tables with an ID higher than 200000040. This has been fixed.
- Fixed error:  
On random occasions Replicator logged the following in the Activity Register on Error:

Customers to Department Specification

8 records Read

8 records Found

8 records Updated

ERROR: < Error Message >

ERROR: < Error Message >

ERROR: < Error Message >

ERROR: < Error Message >

PLEASE NOTE: That even though it says 8 records Read, 8 records Found and 8 records Updated, no records were updated because the transaction rolled back as it should on Error.

This has now been fixed so that it will only log the Error message resulting in these log entries:

Customers to Department Specification

ERROR: < Error Message >

ERROR: < Error Message >

ERROR: < Error Message >

ERROR: < Error Message >

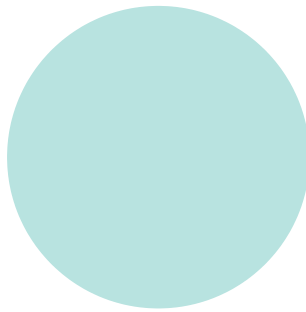
This should avoid any confusion about whether the records were actually updated/added or not.

## Appendix C New Features from version to version

## **Appendix D**

### **Document History**

This appendix describes the changes made to this Replicator for Navision Financials Administrator' s Guide from version to version.



## **D.1 REPLICATOR FOR NAVISION ADMINISTRATOR'S GUIDE 1.00**

Version 1.00 of the Administrator's Guide issued November 1996.

This corresponds to version 1.00 of Replicator for Navision software.

## D.2 REPLICATOR FOR NAVISION ADMINISTRATOR'S GUIDE 1.50

Layout of manual is now according to demands of Navision a/s.

### **Following chapters have been changed and should be read again**

- Chapter 3.
- Chapter 5.
- Chapter 6.

Chapter 6 is renamed from "Using the Flag field facility" to "Special facilities in Specifications" and now describes more facilities than the Flag Field.

When referring to Navision application objects the exact filename is no longer given, before it was `rep14.obj` or `rep14.fob`. Instead, now `rep?? .obj` or `rep?? .fob` is used. The ?? is indicating the version of the objects. Shipping with version 1.5 of the Replicator the files are called `rep15.obj` and `rep15.fob`.

## D.3 REPLICATOR FOR NAVISION ADMINISTRATOR'S GUIDE 1.60

Version 1.60 of the Administrator's Guide issued September 1997. This corresponds to version 1.60 of the Replicator for Navision software.

### **Following chapters have been changed**

- Chapter 1 – Getting Started.
- Chapter 3 – Configuring Replicator for Navision 3.56.
- Chapter 4 – Configuring Replicator for Navision Financials.

### **The following chapters have been moved**

- Chapter 6 moved to 7 (Special facilities in Specifications).
- Chapter 7 moved to 9 (The `replicat.cfg` file and the Log facility).
- Chapter 8 moved to 10 (Troubleshooting and Error Messages).

### **Following chapters have been changed and should be read again**

- Chapter 5 – Using the ToDo table transfer facility. The ToDo facility has been expanded with Star Replication.
- Chapter 7 – Special facilities in Specifications. New features/fields added to replication has been described.
- Chapter 9 – The `replicat.cfg` file and the Log facility. New CFG file options and log additions has been described.

### **Following chapters have been added and should be read**

- Chapter 6 – Using the Actions facility. This chapter describes what the Actions facility is, and how to use it.

- Chapter 8 – Using the Replicator backup facility. How to use the backup facility and what it does are described.

## D.4 REPLICATOR FOR NAVISION FINANCIALS ADMINISTRATOR'S GUIDE 2.0

Version 2.0 of the Administrator's Guide is issued in October 1998. This corresponds to version 2.0 of the Replicator for Navision Financials software.

Chapters have been reorganised and the layout of the guide now meets the demands of Navision standards. This new guide contains a preface, an example and appendixes in addition to the chapters. The contents of the guide has been adjusted to concern Navision Financials users only. All sections about Navision 3.56 have been removed.

- The section; Before You begin; is now a part of a new section; Preface.

### **The following chapters (and sections) have been moved**

- Section 1.2 (New Features) has been moved to Appendix C.
- Section 1.3 (Document History) has been moved to Appendix D.
- Section 3.2 (Importing the Replicator setup Application Objects) has been moved to section 2.6.
- Chapter 5 (Using the ToDo table transfer facility) has been moved to section 4.6.
- Chapter 6 (Using the Action facility) has been moved to section 4.3.
- Chapter 8 (Using the Replicator backup facility) has been moved to section 4.10.
- Chapter 9 (`replicat.cfg` file) has been moved to Appendix A.
- Chapter 9 (Log facility) has been moved to section 3.6, Register.
- Chapter 10 (Troubleshooting and Error Messages) has been moved to Appendix B.



**Following chapter has been added**

- Chapter 5 (Advanced Example).

**Following sections have been added and should be read**

- Section 3.2 (The Replicator Setup facility).
- Section 4.11 (The Scheduler).

## **D.5 REPLICATOR FOR NAVISION FINANCIALS ADMINISTRATOR'S GUIDE 3.00**

Version 3.00 of the Administrator's Guide is issued in March 2000. This corresponds to version 3.00 of the Replicator for Navision Financials.

### **Following chapter has been moved and changed**

- Chapter 5 (Advanced Example) to Chapter 6.

### **Following sections have been moved, changed and renamed**

- Section 2.7 (Additional installation procedures if transferring data to/from Navision 3.56 databases) to section 2.8 (Files required if transferring data to/from Navision 3.56 databases).
- Section B1 (Troubleshooting) to section A.1 (Troubleshooting and Error Messages).

### **Following section has been changed and renamed**

- Section 2.3 (Contents of the Replicator installation diskette) has been renamed to (Contents of the Replicator installation CD).

### **Following chapter and sections have been added**

- Section 2.7 (Files required when transferring data to/from Navision Financials databases).
- Section 2.9 (Files required if transferring data to/from Navision Financials databases hosted by an MS-SQL Server).
- Section 4.12 (The CompanyExport and CompanyImport facilities).
- Chapter 5 (The Replicator Server).
- Section B1 (Tracing Errors).

**Following sections and appendixes have been changed and should be read again**

- Section 3.2 (The Replicator Setup facility).
- Section 3.3 (The Databases facility).
- Section 3.7 (Running the Replicator).
- Section 4.2 (The Source Counter).
- Section 4.3 (The Actions facility).
- Section 4.7 (The Export and Import facilities).
- Section 4.10 (Using the Replicator Backup facility).
- Appendix A (The Replicator configuration file).

**Following sections have been changed**

- Section 1.1 (General description).
- Section 2.1 (Requirements).
- Section 2.2 (Quick Installation and setup list).
- Section 2.4 (Where to install what?).
- Section 2.5 (Installing the Replicator for Navision Financials).
- Section 2.6 (Importing the Replicator Application objects).
- Section 3.1 (Setting up the Replicator, Setup Menu).
- Section 3.5 (Setting up transfers of data using Specifications).
- Section 3.6 (Other options when setting up Specifications).
- Section 3.8 (Transfer design into the Setup database).
- Section 4.1 (The Flag Field).

## Appendix D Document History

- Section 4.4 (Sub Specifications).
- Section 4.5 (Tags).
- Section 4.11 (The Scheduler).

## **D.6 REPLICATOR FOR NAVISION FINANCIALS ADMINISTRATOR'S GUIDE 4.00**

Version 4.00 of the Administrator's Guide is issued in June 2001. This corresponds to version 4.00 of Replicator for Navision Financials.

### **Following appendix and chapters have been added and should be read**

- Chapter 6 (Running Replicator).
- Chapter 7 (Running Replicator tasks as Services (NT Services)).
- Appendix B (The tab "Miscellaneous" within Replicator INI Editor).

### **Following chapters and sections have been moved or/and changed and should be read again**

- Section 2.3 (Contents of the Replicator installation CD).
- Section 2.5 (Installing the Replicator for Navision Financials) has been changed, renamed and moved to section 2.4 (Installing the Replicator program).
- Section 2.7 (`Replicat.ini` (Replicator INI Editor)).
- Section 3.3 (The Databases facility).
- Section 3.7 (Running The Replicator) has been changed, renamed and moved to section 6.1 (Running Replicator).
- Chapter 5 (The Replicator Server).

### **Following chapter and appendix has been moved and changed**

- Chapter 6 (Advanced Example) has been moved to Chapter 8.
- Appendix B (Troubleshooting and Error Messages) has been changed and moved to Appendix A.

- Appendix C (New Features from version to version) has been changed and moved to Appendix B.
- Appendix D (Document History) has been changed and moved to Appendix C.

**Following sections have been changed, renamed and moved**

- Section 2.1 (Requirements) has been changed and renamed to (System Requirements).
- Section 2.6 (Importing the Replicator Application objects) has been renamed and moved to section 2.5 (Installing the Replicator Setup Application).
- Section 2.7, 2.8 and 2.9 (Files required when transferring data to/from: Navision Financials databases - Navision 3.56 databases and databases hosted by an MS-SQL Server) have been changed, renamed and moved to section 2.6 (Ensuring access to the Navision database).
- Section 3.4 (The Groups facility) has been moved to section 4.1.
- Section 3.5 (Setting up transfers of data using Specifications) has been moved to section 3.4.
- Section 3.6 (Other options when setting up Specifications) has been renamed and moved to section 3.5 (Other setup options within Specifications).
- Section 3.8 (Transfer Design into the Setup Database) has been renamed and moved to section 3.6 (Read Design into the Replicator Setup database).
- Section 4.1 (The Flag Field) has been moved to section 4.2.
- Section 4.2 (The Source Counter) has been moved to section 4.3.
- Section 4.3 (The Actions facility) has been moved to section 4.4.
- Section 4.4 (Sub Specifications) has been moved to section 4.5.

- Section 4.5 (Tags) has been moved to section 4.6.
- Section 4.6 (The ToDo table transfer facility) has been moved to section 4.7.
- Section 4.7 (The Export and Import facilities) has been moved to section 4.8.
- Section 4.8 (Change Register) has been moved to section 4.9.
- Section 4.9 (Transfer of Objects in Navision Financials) has been moved to section 4.10.
- Section 4.10 (Using the Replicator Backup facility) has been renamed and moved to section 4.11 (The Replicator Backup Server and BackupCompare facilities).
- Section 4.11 (The Scheduler) has been moved to section 4.12.
- Section 4.12 (The CompanyImport and CompanyExport facilities) has been moved to section 4.13.
- Appendix A (The Replicator configuration file (`replicat.cfg`)) has been changed, renamed and moved to section 2.7 (`Replicat.ini` (Replicator INI Editor)).

**Following section has been deleted**

- Section 2.4 (Where to install what).

**Following sections have been changed**

- Section 1.1 (General description).
- Section 2.2 (Quick Installation and Setup list).
- Section 3.1 (Setting up the Replicator (in general) ).

## **D.7 REPLICATOR FOR NAVISION ATTAIN/FINANCIALS ADMINISTRATOR'S GUIDE 4.10**

Version 4.10 of the Administrator's Guide is issued in February 2002. This corresponds to version 4.10 of Replicator for Navision Attain/Financials.

### **Following sections have been changed**

- Section 3.3 (The Databases facility).



## D.8 REPLICATOR FOR MBS-NAVISION ADMINISTRATOR'S GUIDE 4.20

Version 4.20 of the Administrator's Guide is issued in April 2004. This corresponds to version 4.20 of Replicator for MBS-Navision.

### **Following sections have been changed**

- Section 2.3 (Contents of the Replicator installation CD).
- Section 2.5 (Installing the Replicator Setup Application).
- Section 2.7 (Replicat.ini (Replicator INI Editor)).
- Section 3.3 (The Databases facility).
- Section 3.4 (Setting up transfers of data using Specifications).
- Section 4.11 (The Replicator Backup server and BackupCompare facilities).
- Section 6.2 (Running Replicator from a command line prompt).
- Appendix A (Tracing errors).

### **Following sections have been changed and should be read again**

- Section 4.3 (The Source Counter).
- Section 4.4 (The Actions facility).

### **Following appendix has been added and should be read**

- AppendixB (Source Counter and Action code in MBS-Navision 3.70 or later).

### **Following chapters have been renamed**

- Chapter 2 (Installing Replicator for Navision Attain/Financials) to (Installing Replicator for MBS-Navision).

**Following Appendix has been moved and renamed**

- AppendixB (The tab “Miscellaneous” within Replicator INI Editor) has been moved to section 2.7 (The tab “Miscellaneous”).

## D.9 REPLICATOR FOR MICROSOFT DYNAMICS NAV ADMINISTRATOR'S GUIDE 4.22

Version 4.22 of the Administrator's Guide is issued in March 2007. This corresponds to version 4.22 of Replicator for Microsoft Dynamics NAV.

### **Following sections have been changed**

- Section 2.1 (System Requirements).
- Section 2.3 (Contents of the Replicator installation CD).
- Section 3.5 (Other setup options within Specifications).
- Section 5.3 (The Replicator Server).
- Appendix A (Tracing errors).

### **Following sections have been changed and should be read again**

- Section 4.3 (The Source Counter).

### **Following chapters have been renamed**

- Chapter 2 (Installing Replicator for MBS-Navision) to (Installing Replicator for Microsoft Dynamics NAV).
- Chapter 7 (Running Replicator tasks as services (NT Services) to (Running Replicator as a service (Windows Service)).

## **D.10 REPLICATOR FOR MICROSOFT DYNAMICS NAV ADMINISTRATOR'S GUIDE 4.30**

Version 4.30 of the Administrator's Guide is issued in July 2009. This corresponds to version 4.30 of Replicator for Microsoft Dynamics NAV.

### **Following sections have been changed**

- Section 1.1 (General description).
- Section 2.1 (System Requirements).
- Section 2.3 (Contents of the Replicator installation CD).
- Section 4.3 (The Source Counter).
- Section 4.9 (Change Register).
- Section 4.12 (The Scheduler).
- Section 8.2 (Setting up transfers of changed data).
- 

### **Following sections have been changed and should be read again**

- Section 4.10 (Transfer of objects in MS Dynamics NAV).

### **Following Appendix has been changed**

- Appendix B1 (Implementing Source Counter and Actions)

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