

**Tamino**

**X-Node: Mapping to External Databases**

Version 8.2.2

October 2013

This document applies to Tamino Version 8.2.2.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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# Preface

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This document describes the X-Node feature of Tamino. It is intended for database administrators and application programmers.

The X-Node feature enables the Tamino X-Machine to communicate with non-Tamino databases.

This information is structured into the following sections:

*Introduction*

*Installation*

*X-Node ODBC Support on UNIX Systems*

*X-Node Access to Adabas*

*X-Node Mapping Examples*

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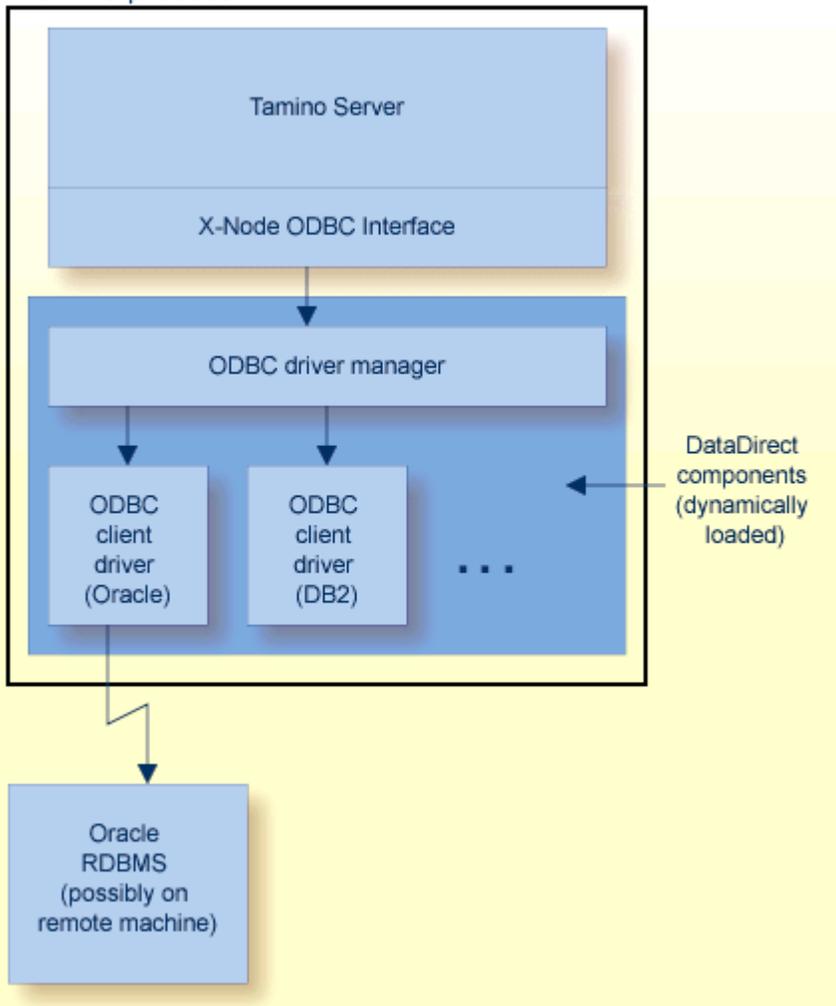
# 1 Introduction

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Tamino communicates with Adabas via a Software AG internal interface, and with other external database systems via ODBC (Open Database Connectivity). For Tamino running on Microsoft Windows systems, ODBC is part of the operating system, so you do not have to install any additional software. For Tamino running on UNIX systems, ODBC support in Tamino is provided by the third-party products Connect (for 32-bit systems) and Connect64 (for 64 bit systems), both products from **DataDirect Technologies** (previously known as Merant). The Connect or Connect64 product must be installed on the Tamino node in order to enable X-Node communication from Tamino to an external database via ODBC. Instructions on how to install Connect/Connect64 are provided in the section *Installation* below.

Connect and Connect64 provide an ODBC driver manager and the required ODBC client drivers for the supported external databases. During an active Tamino process, the driver manager and the appropriate client driver for the external database are loaded dynamically as required.

Tamino process



# 2 Installation

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The following paragraphs summarize the installation of X-Node and Connect/Connect64.

## Installing X-Node

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X-Node is installed as part of the standard Tamino XML Server installation. Note, however, that X-Node can only be activated if you have purchased the X-Node license option.



**Note:** If you want to use X-Node on a UNIX platform, the environment variables `ODBCINI` and `SQLNK_ODBC_HOME` must be defined. To define these variables you can use commands similar to the following examples:

```
regutil setvaluedata "HKLMS\Software AG\Tamino\8.0\environment" "ODBCINI" ↵  
"/opt/softwareag/Tamino/v80/connect/odbc.ini"  
regutil setvaluedata "HKLMS\Software AG\Tamino\8.0\environment" "SQLNK_ODBC_HOME" ↵  
"/opt/softwareag/Tamino/v80/connect/lib"
```

Modify the paths `/opt/softwareag/Tamino/v80/connect/odbc.ini` and/or `/opt/softwareag/Tamino/v80/connect/lib` as necessary to suit your installation.

## Installing Connect/Connect64 on UNIX systems

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The Connect/Connect64 ODBC software is installed automatically during the Tamino XML Server installation process. However, some configuration of the Connect/Connect64 file `odbc.ini` is also required. This file is located in the directory `InstallDir/connect` after the Tamino installation, where `InstallDir` represents the Tamino installation directory. The configuration of this file is described in the Connect/Connect64 Reference Guide, which is available in the following location:

- For 32-bit systems: in the PDF file `InstallDir/connect/doc/odbceref.pdf`
- For 64-bit systems: in the PDF file `InstallDir/connect/doc/odbc64ref.pdf`

## 3 X-Node ODBC Support on UNIX Systems

The Connect/Connect64 ODBC drivers included in the Tamino distribution kit support the following target databases:

Database	HP-UX 11i (64 bit)	AIX 5.2 (64 bit)	SunOS 5.9 (64 bit)	Red Hat Enterprise Linux 3.0 (32 bit)	SUSE Linux Enterprise Server 9.0 (32 bit)
DB2 UDB v7.1, v7.2, v8.1 for Windows, UNIX, and Linux	yes	yes	yes	yes	yes
DB2 UDB v8.2 for Linux, UNIX, Windows				yes	yes
DB2 UDB v6.1 for OS/390	yes	yes	yes	yes	yes
DB2 UDB v7.x for z/OS	yes	yes	yes	yes	yes
DB2 UDB v7.x for OS/390	yes	yes	yes		
DB2 UDB v8.1 for z/OS				yes	yes
DB2 UDB V5R1, V5R2 for AS/400	yes	yes	yes		
DB2 UDB V4R5 for AS/400	yes	yes	yes	yes	yes
DB2 UDB V5R1, V5R2 for iSeries				yes	yes
DB2 UDB V5R3 for iSeries				yes	yes
Informix Dynamic Server with Universal Data Option 9.1.4	yes	yes	yes		
Informix Dynamic Server 9.2x, 9.3x, 9.4x	yes	yes	yes	yes	yes
Informix Dynamic Server 10				yes	yes
Oracle8i R1 (8.1.5, 8.1.6, 8.1.7)				yes	yes
Oracle8i R2, R3 (8.1.5)				yes	yes
Oracle8i R2, R3 (8.1.6, 8.1.7)	yes	yes	yes	yes	yes
Oracle9i R1, R2 (9.0.1, 9.2)	yes	yes	yes	yes	yes
Oracle10g R1 (10.1)	yes	yes	yes	yes	yes

Database	HP-UX 11i (64 bit)	AIX 5.2 (64 bit)	SunOS 5.9 (64 bit)	Red Hat Enterprise Linux 3.0 (32 bit)	SUSE Linux Enterprise Server 9.0 (32 bit)
Sybase Adaptive Server 11.5 and higher	yes	yes	yes		
Sybase Adaptive Server 11.5 and 11.9				yes	yes
Sybase Adaptive Server Enterprise 12.0, 12.5, 12.5.1	yes	yes	yes	yes	yes
Sybase Adaptive Server Enterprise 12.5.2, 12.5.3				yes	yes

Check the web site of [DataDirect Technologies](#) for further information of supported platforms.



**Note:** The DataDirect software provided with the Tamino XML Server kit works only in conjunction with Software AG products.

# 4 X-Node Access to Adabas

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This section gives an overview of accessing an Adabas database from Tamino via X-Node, and provides various examples.

The following section is structured as follows:

## General

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### Network setup

If Tamino and Adabas are running on the same machine, the X-Node link between them is available automatically when Adabas version 3.3 or later is running, therefore you do not have to configure the software. This is because these Adabas versions include the ADALNKX DLL (Windows) or shared library (UNIX) that builds the connection automatically.

If Tamino and Adabas version 3.2 are running on the same machine, the ADALNKX DLL (Windows) or shared library (UNIX) is required in order to build an X-Node link. You can install ADALNKX by installing either the Entire Net-Work Client software or the full Entire Net-Work package.

Access to a remote Adabas installation requires the use of the XTS internal product, which is included in the Tamino kit.

### Using Natural date and time fields

Natural stores date and time values into Adabas fields with format "P", i.e., as integer numbers. If such a Natural date field has the datatype `xs:date` in the Tamino schema, then the internal value representation will be converted to a readable date value according to the XML Schema specification. Similarly, a Natural time field is specified as `xs:dateTime`. Also, when storing an XML document into an Adabas X-Node mapped doctype, `xs:date` and `xs:dateTime` fields will be converted into the Natural internal format.

Natural date and time values have the following restrictions:

- Dates range from a hypothetical "Jan 1, 0000" to "Dec 31, 2699".
- A Natural time has a precision of 0.1 seconds, whereas XML Schema allows arbitrary fractions of a second.

As a consequence, when storing XML documents into an Adabas X-Node mapped doctype, dates outside the Natural date range will be rejected, and seconds will be rounded to a precision of 0.1 seconds.

## Tamino Access to Adabas on Windows

The following section describes how to configure Tamino to access Adabas, and also includes examples of read, write and delete operations.

- [Reading from an Adabas Database](#)
- [Writing to and Deleting from an Adabas Database](#)
- [Accessibility of the XTS Directory Service](#)

### Reading from an Adabas Database

Perform the following steps:

1. Using the Tamino Manager, create and start a Tamino database (or choose an existing one);
2. The file called *ada\_empl.tsd* in the directory *Documentation/tsl* under the Tamino installation directory contains a TSD schema for the example described in the section *Example Schema for Adabas Mapping* in the Tamino Schema Definition Language documentation.

In this file, change the database number (to 211 in the example) and the file number. The element `tsd:subTreeAdabas` has two attributes `dbid` and `fnr` that contain this information;

3. In the Tamino Interactive Interface, define the collection by performing the following steps:
  - In the field **Database URL** of the **Define** tab, enter the name of the Tamino database (replace *mydb* with the name of your database);
  - Enter the location of *ada\_empl.tsd* in the **Schema file** field and choose the **Define** button.

The message

```
<ino:messageLine>_DEFINE: schema ada_empl in collection ada_empl ↵
defined</ino:messageLine>
```

shows that the definition was successful;

4. Access the desired data on Adabas:
  - In the field **Collection** of the **X-Query** tab, enter the name of the collection, namely "ada\_empl".
  - In the Query field, enter a query expression and choose the **Query** button.

Examples:

```
employee[name/surname='ADAM']  
employee[address/city='ATLANTA']
```

## Writing to and Deleting from an Adabas Database

You can also write data into an Adabas database. To do this, perform these steps:

1. Create an XML instance of the schema that you defined in the previous step. For example, you can copy the sample XML instance that defines an employee "James Bond" from the documentation section *Example Schema for Adabas Mapping* mentioned above. In the following example, the XML instance file is called *bond.xml*.
2. Specify the location of the *bond.xml* file in the **Load file** field of the **Load** tab of the Tamino Interactive Interface, then choose the **Load** button. Tamino should generate the following response:

```
<ino:messageline>document processing started</ino:messageline>  
</ino:message>  
<ino:object ino:collection="ada_empl" ino:doctype="employee" ino:id="1" />  
<ino:message ino:returnvalue="0">  
<ino:messageline>document processing ended</ino:messageline>
```

Note that you can only write at most one "James Bond" instance to the Adabas database, because of unique key requirements.

3. Specify the following query in the **X-Query** field of the **X-Query** tab:

```
employee[name/surname='Bond']
```

then click on the **Query** button. Note that this example assumes that you have used the sample data from the Tamino user documentation. If you created other data, replace the query shown above by an appropriate query for your data. Note also that the query is case-sensitive, so in this example, you must specify "Bond" and not "BOND".

To delete this element, do the following:

1. Enter the following query in the **Delete Query** field of the **Delete** tab:

```
employee[name/surname='Bond']
```

then click on the **Delete** button.

If the deletion is successful, Tamino returns the following response:

```
<ino:messageLine>_DELETE: document(s) deleted</ino:messageLine> ←
```

## Accessibility of the XTS Directory Service

You may receive an error message INOAAE0172 when you try to create or start a Tamino database or access an existing Tamino database. This happens if the directory service of Software AG's base technology product Extended Transport Service (XTS) is not reachable. Possible causes are:

- The XTS configuration file on your computer specifies an invalid IP address for the host where the XTS directory service should be active. The IP address is defined in the DNS (Domain Name System) or in the file *hosts* that is located in the folder *%systemroot%\system32\drivers\etc*. In this file, there should be an entry for "SAGXTSDSHost" like the following:

```
# Software-AG--Tamino----
127.0.0.1 SAGXTSDSHost
```

- The IP address is valid but the host is currently not reachable;
- The XTS directory service is not active on the host;
- The database cannot be found because of different XTS distribution services (different hosts).
- If the directory service is local, the IP address should be specified as 127.0.0.1, otherwise problems can arise, in particular with portable devices.

## Tamino Access to Adabas on UNIX

The following section describes how to configure Tamino to access Adabas and gives examples of read, write and delete operations.

- [Starting XTS](#)
- [Reading From an Adabas database](#)
- [Writing To and Deleting From an Adabas Database](#)

### Starting XTS

If your configuration requires XTS, as described above, proceed as follows.

Start XTS as usual, for example, with one of the following commands:

Platform	Command
Solaris, Linux (IA-32), Linux S/390	sh /etc/init.d/sagxts start
AIX	sh /etc/sagxts start
HP-UX	sh /sbin/init.d/sagxts start

### Reading From an Adabas database

The instructions for reading from an Adabas database on UNIX are the same as for reading from an Adabas database on Windows, with one restriction on the use of the Mozilla browser, as described below. See the section [Reading from an Adabas database](#) in the Windows section above for the general instructions on reading from an Adabas database.

The restriction when using Mozilla is as follows: When the Tamino Interactive Interface is running in the Mozilla browser, the extension *.tsd* is not recognized, therefore it is necessary to assign a different extension such as *.xml* to the schema file. You can do this by executing a copy command in the *Documentation/tsl* directory:

```
cd $INODIR/%INOVERS/Documentation/tsl
cp ada_empl.tsd ada_empl.xml
```

### Writing To and Deleting From an Adabas Database

The instructions for writing to and deleting from an Adabas database on UNIX are the same as for writing to and deleting from an Adabas database on Windows. See the section [Writing To and Deleting From an Adabas Database](#) in the Windows section above for general instructions on writing to and deleting from an Adabas database.

The restriction on the use of the Mozilla browser described in the previous section also applies when writing and deleting.

# 5 X-Node Mapping Examples

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Examples of how to specify the formal relationship between a Tamino schema and an external database table are provided in the External Mapping section in the chapter *Tamino-Specific Extensions to the Physical Schema* of the documentation for Tamino XML schema language.



**Note:** If you intend to use X-Node to connect to a read-only or replication (simultaneous query) database of a relational database system, all primary keys must be mapped.



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