

Adabas Star

Storing data in individual files of databases on local machines that are not integrated in any network is a rather limited approach when designing large and complex applications. To gain flexibility and safety, data can be distributed across several Adabas databases which may reside on different machines. Such distributed data structures can be realized with the Software AG product Adabas Star.

Distributed data structures for use with Adabas Star and can be defined in Predict, and the objects necessary to implement the structures physically can be generated from these definitions.

It is important to understand that storing data in the good old-fashioned way (simple files residing in isolated databases on local machines) also establishes a data distribution structure, albeit a very simple one. The description given below therefore also applies to the definition of simple files.

Note:

This section applies exclusively to Adabas files. See documentation Adabas Star Distributed Processing Facility for a complete description of this product.

The Software AG product Entire Transaction Propagator can also be used to define distributed data structures. This section describes how data distribution structures are defined. This section covers the following topics:

- Different Types of Data Distribution
- Defining the Distribution of Data in Predict
- Defining a Network, Virtual Machine and Database Structure
- Defining the File Structure
- Including the Definition in the STARTAB Table
- Retrieving Information on the Use of ADASTAR Numbers
- Generating, Incorporating, Comparing and Maintaining Data Definitions under Adabas Star

Different Types of Data Distribution

Adabas Star offers various options for distributing data across a network.

- **Storing Data Locally in an Isolated Database**
Adabas Star is not required if data is stored locally in a single database. In this case, the database is called an isolated database and the logical ADASTAR type of all files is either simple or expanded.
- **Distributing/Duplicating Data Across Several Databases (Adabas Star)**
With Adabas Star, data belonging to one logical file can be physically distributed across several physical files (that may reside in different databases).
There are two forms of distribution:
 - Data logically belonging to one file can be split between several physical files.
For example: A (logical) file is defined to store information on all customers of a company. Data of customers living in the north is to be stored separately from the data of customers living in the south of the country. The zip code is used as the distribution criterion.
A file with the logical ADASTAR type partitioned can be used to store data in this fashion.
 - Data can be duplicated for security or performance reasons. Two options are:
 - Files of type replicated can be duplicated across files in several databases.
 - Individual physical files of a logical file of type partitioned can be duplicated either across files in several databases or across files in a single database.
 See Defining the File Structure for a diagram illustrating data distribution with distributed and replicated data.
- **Storing Data in Remote Databases (Net-work)**
With Net-work, data stored in databases on remote systems can be accessed as if it were stored locally. The use of this product is described in the documentation of Net-work.
- **Distributing/Duplicating Data Across Several Databases on Different Machines**

By combining Net-work and Adabas Star, data belonging to one file can be distributed across several databases residing on different machines.

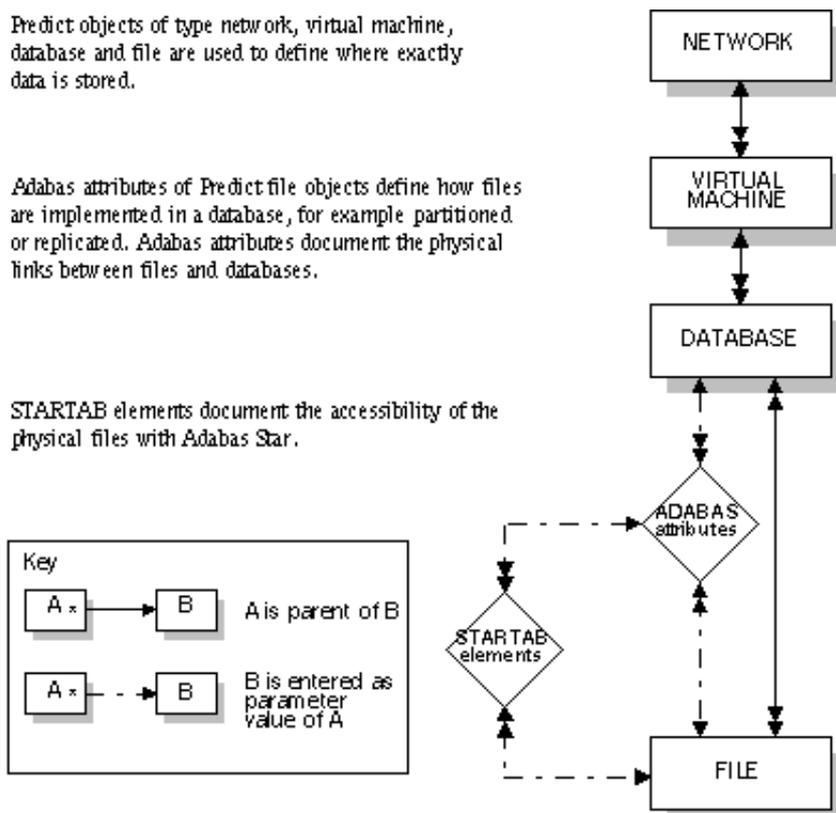
Defining the Distribution of Data in Predict

General Information

Predict objects of type network, virtual machine, database and file are used to define where exactly data is stored.

Adabas attributes of Predict file objects define how files are implemented in a database, for example partitioned or replicated. Adabas attributes document the physical links between files and databases.

STARTAB elements document the accessibility of the physical files with Adabas Star.



Links between networks, virtual machines, databases and files are defined as follows:

- Links between networks, virtual machines, databases are defined with attributes of the respective lower level objects, for example: the link between a network and a virtual machine is defined with the parameter in Network of the virtual machine.
Each virtual machine object must be linked to a network object, and each database object must be linked to a virtual machine object.
- Links between databases and files are defined with the function Link children.
- Information on how files are implemented in a database is stored in the Adabas attributes of file objects.
Adabas attributes can be modified by entering the line command .A when editing the file list of a database or with the file maintenance function Modify Adabas attributes.

Defining the Distribution of Data

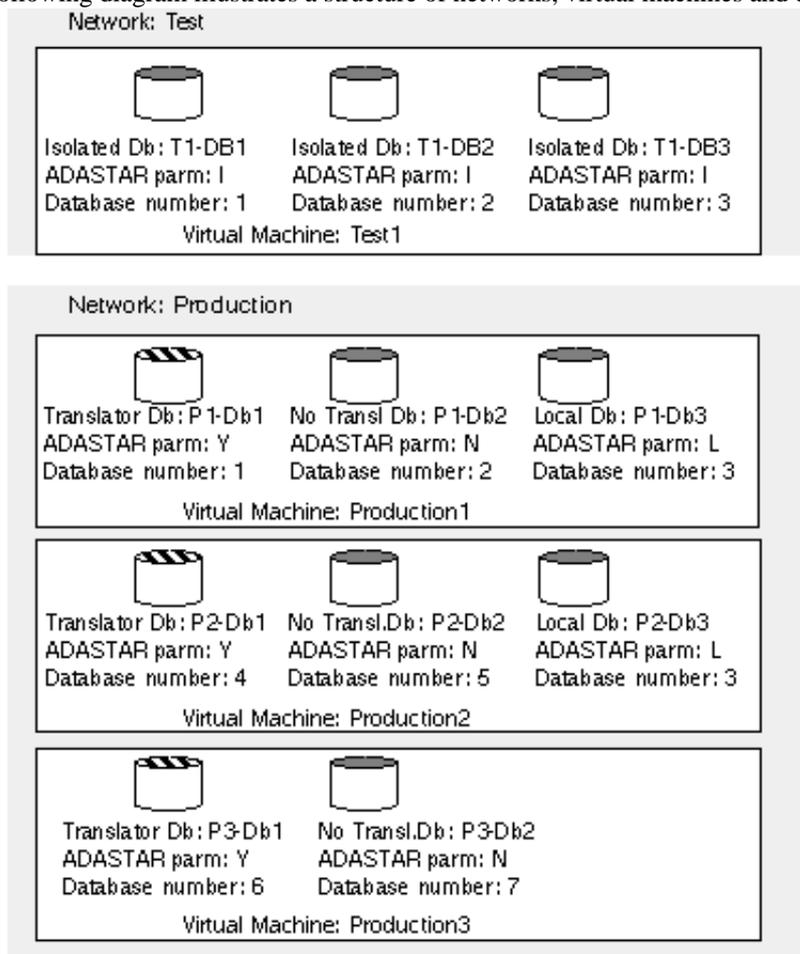
Defining the distribution of data is a two-step process:

1. Define the structure of the data distribution by creating and linking the respective network, virtual machine, database and file objects. See the sections Defining a Network, Virtual Machine and Database Structure and Defining the File Structure.
2. Determine the accessibility of data by creating STARTAB elements for physical file definitions. An ADASTAR translation table can be generated from STARTAB elements.
See section ADASTAR Translation Table in section **Generation** in the **External Objects in Predict**

documentation.

Defining a Network, Virtual Machine and Database Structure

Since data can be distributed across several databases, the exact location of data storage has to be specified: each database object must be linked to a virtual machine and each virtual machine must be assigned to one network. The following diagram illustrates a structure of networks, virtual machines and databases.



Defining Networks and Virtual Machines

Networks and virtual machines identify the location of databases.

What is a Network?

- A network contains all virtual machines and databases that are to be accessed. In the case of databases that reside on local machines without any remote databases being connected, a network may in fact identify a local machine.
- A network object HOME is provided by Predict.

What is a Virtual Machine?

- A Predict object Virtual Machine identifies a machine and operating system environment of databases. A virtual machine represents one Adabas SVC (supervisor call).
- Each virtual machine can contain one translator database used to distribute Adabas calls across the network. However, a virtual machine does not necessarily have to contain a translator database.

Note:

Predict needs to know which database serves as the Adabas Star translator database for the current Natural session to correctly execute generation, incorporation, comparison and some special functions that access databases.

See Determining the Adabas Star Translator Database.

Attributes of Networks and Virtual Machines

- A network object has all the standard attributes of Predict objects (for example extended description and abstract) and no type-specific attributes.
- A virtual machine object has all the standard attributes plus the type-specific attribute Operating system type.

Note:

Network and virtual machine attributes are described in detail in the respective sections of the **Predefined Object Types in Predict documentation**.

Defining a Database

```

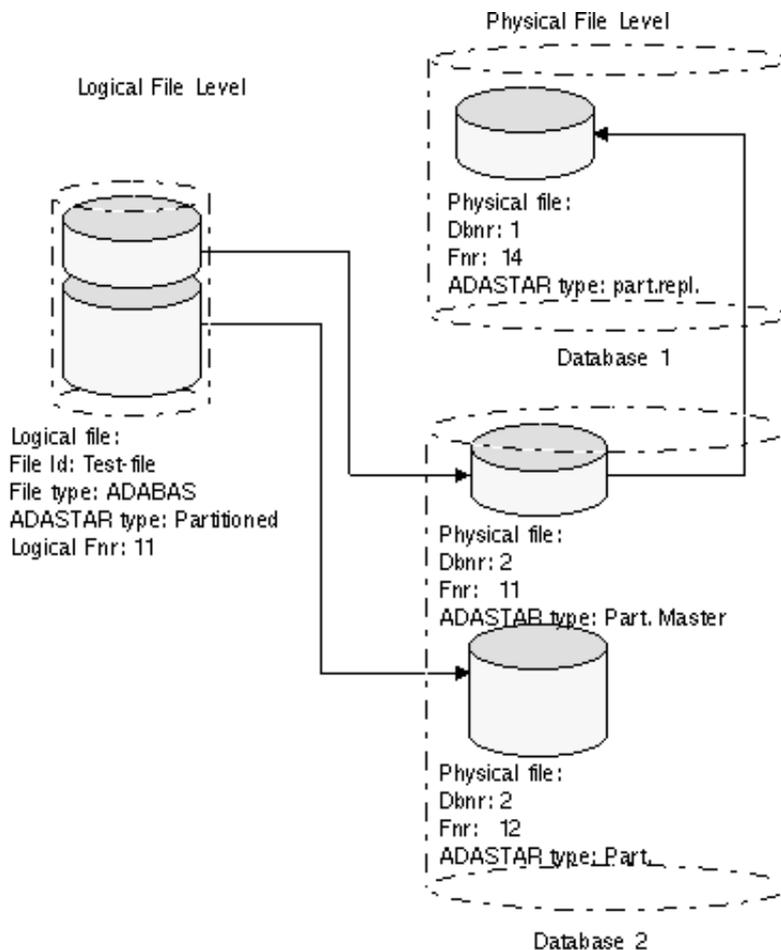
14:36:38          ***** P R E D I C T 4.2.1          *****                2001-09-29
                        - Add a database -
Database ID ..... DATABASE-TEST7                                +All---ADASTAR parameter-----+
                                                                ! _ I   Isolated                !
                                                                ! _ L   Local                    !
                                                                ! _ Y   Translator               !
                                                                ! _ N   No Translator            !
Database type .....* A ADABAS                                     ! _                               !
in Virtual Machine .....* HOME                                   ! _                               !
ADASTAR Parameter.....* * No ADAST ! _                               !
Physical database number ..*                                     ! _                               !
                                                                ! _                               !
    
```

Note:

Database attributes are described in detail in section Database in the **Predefined Object Types in Predict documentation**.

Parameters																
in virtual machine	Associates the database to a virtual machine. Must be specified for all databases except types Conceptual, DB2 and IMS. A default virtual machine can be defined in the profile. See Maintenance Options in section User Interface in the Introduction to Predict documentation .															
ADASTAR parameter	<p>Determines the use of the database with respect to the distribution of data with Adabas Star. Valid Values: Isolated, Local, Translator, No Translator.</p> <p>Note: The Predict parameter ADASTAR parameter corresponds to the ADARUN parameters Adastar and Local. The corresponding values in Predict and ADARUN are shown in the table below:</p> <table border="1"> <thead> <tr> <th>Predict: ADASTAR Parameter</th> <th>ADARUN: ADASTAR</th> <th>Local</th> </tr> </thead> <tbody> <tr> <td>Isolated</td> <td>Iso</td> <td>No</td> </tr> <tr> <td>Local</td> <td>Iso</td> <td>Yes</td> </tr> <tr> <td>Translator</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>No translator</td> <td>No</td> <td>No</td> </tr> </tbody> </table> <p>I Isolated Adabas Star is not used. The database may be accessible using NET-WORK. A database of type isolated can only contain files of the types simple and expanded.</p> <p>L Local The database cannot be accessed using Net-work.</p> <p>Y Translator Adabas Star is used. The database contains the ADASTAR translation table that is used to determine the physical files behind any logical file number. Only one database in each virtual machine can be defined as the translator database. If a second database is defined with Y (Translator), the ADASTAR parameter of the first translator database is set to N. Before that, a warning is issued and additional confirmation is requested.</p> <p>N No translator Adabas Star is used. The database does not contain the translator table.</p>	Predict: ADASTAR Parameter	ADARUN: ADASTAR	Local	Isolated	Iso	No	Local	Iso	Yes	Translator	Yes	No	No translator	No	No
Predict: ADASTAR Parameter	ADARUN: ADASTAR	Local														
Isolated	Iso	No														
Local	Iso	Yes														
Translator	Yes	No														
No translator	No	No														
Physical database number	<p>Identifies a database in a virtual machine and, in the case of databases that can be accessed using Adabas Star, in a network.</p> <ul style="list-style-type: none"> ● If a database can be accessed using Adabas Star (ADASTAR parameter is set to Y or N), the Physical database number must be unique throughout the network. ● If a database is of type isolated or local, the Physical database number must be unique only within a virtual machine. <p>However, it is recommended to use physical database numbers that are unique throughout a network for local and isolated databases as well.</p> <p>The uniqueness of physical database numbers can be forced by setting the parameter Unique-DBnr/Fnr in the second Miscellaneous screen of the General Defaults function. See section Defaults in the Predict Administration documentation.</p>															

Defining the File Structure



Description of the Structure

The above diagram shows how data distribution is defined on two levels:

- The **logical** level
The file Test-file has the logical ADASTAR type partitioned.
- The **physical** level
The data is distributed across the physical files 11 and 12 in database 2.
Physical file 11 in database 2 has the type partitioned-master. This file is copied in file 14 in database 1 (type partitioned-replicated).

Defining a File Structure Logically and Physically

The diagram shows that files are defined on the logical and the physical file level:

- **On the logical level.**
Defining a logical file includes the definition of the fields in a file.
Files of type simple, expanded, partitioned, replicated and PROPAGATOR can be defined on the logical level.
See Defining a Logical file.
- **On the physical level**
The exact physical implementation for the storage of data is defined.
Depending on the logical ADASTAR type, different types of physical files can be implemented. The following table shows which types of physical files can be used for files with different logical ADASTAR types.

See Defining the Physical Implementation of Logical Files.

Logical Level	Physical Level
simple	simple
expanded	expanded, simple
partitioned	partitioned, partitioned master, partitioned replicated, simple
replicated	replicated master, replicated, simple
PROPAGATOR	PROPAGATOR master, PROPAGATOR replicated, simple

Defining a Logical File

In the first screen that is displayed when you define a file, basic attributes of the file are specified. The parameters that are important when defining files for use with Adabas Star are described below.

See also section File in the **Predefined Object Types in Predict documentation**.

```

17:01:26          ***** P R E D I C T  4.2.1  *****                2001-11-12
                        - Add a file -
File ID ..... ADABADA-33          +All-----ADASTAR types-----+
                                   ! _ E   Expanded file           !
                                   ! _ P   Partitioned              !
                                   ! _ R   Replicated               !
                                   ! _ N   PROPAGATOR file          !
                                   ! _ ' ' Simple file              !
                                   ! _                                     !
                                   ! _                                     !
File type .....* A ADAB          ! _                                     !
Master file .....*                ! _                                     !
File number .....* 123            ! _                                     !
logical ADASTAR type ...* * Simp ! _                                     !
in database .....*                ! _                                     !
    
```

Parameters	
File number	If a database is specified, the file number of the logical file is taken as a physical file number automatically (if this is possible). If not, a free physical number can be selected from a selection window. The file number must be in the range 1 - 5000.
Logical ADASTAR type	Determines how the file can be implemented in an Adabas Star or Entire Transaction Propagator environment. E Expanded: to be implemented in several physical files with identical FDT but different data in each physical file (continuous file) P Partitioned: as expanded but data is accessed with Adabas Star R Replicated: to be implemented in several physical files. Each file has the identical FDT and contains the same data. N Propagator file: to support multiple, partially replicated copies of one physical file with Entire Transaction Propagator. blank Simple file (default).
in database	A link to this database is established.

Commands in the Select one or more physical files window	
A	Add a new physical file definition. A can only be entered in the line **new** at the top of the list. The Add command displays a window to enter a physical database ID and subsequently the Modify Adabas Attributes screen.
M, X or /	Modify the physical file definition. The Modify Adabas Attributes screen is displayed.
P	Purge the physical file definition. Additional confirmation is requested. The physical file is removed from the file list of the database.

Specifying the ADASTAR Attributes of Physical Files

```

14:47:38          ***** P R E D I C T  4.2.1  *****                2001-09-29
                    - Add ADABAS attributes -
File ID ..... JPE-PART4                +----Additional attributes-----+
Type ..... ADABAS, Partitioned         ! --> Mark one or more           !
in database .... HEB-DA-3 (PDBnr: 33333) !      attributes                 !
                                           ! _  ADASTAR attributes           !
Required attributes                      Ph ! _  Miscellaneous attributes    !
  Phys. file number ..* 146              ! _  ADAM key definition          !
  Min ISN ..... 1                       ! _  Extent allocation            !
  Max ISN .....                          ! _  File criterion               !
                                           !                               !
      Device      Cylinder Blocks  Paddin !                               !
      *-----   - - - - - - - - - - - - - !                               !
ASSO   3380   UI                               !                               !
              NI                               !                               !
DATA   3380   DS                               !                               !
                                           !                               !
Loading attributes                        Lo !                               !
  Max recl. ....                          !                               !
  ISN reuseage ..... N (Y,N)              !                               !
  User ISN ..... N (Y,N)                  +-----+
                                           !                               !

EDIT:  Owner: N  Desc: N  Field list: N  MORE: *Attributes: Y
DIC1117 ADABAS ATTRIBUTES NOT MODIFIED.
    
```

The Additional attributes window that is displayed by entering Y in the MORE Attributes field of the Modify Adabas Attributes screen (see screen above) contains two topics needed for defining data distribution:

- ADASTAR attributes
- File criterion

Both topics are described in the sections Specifying ADASTAR Attributes and Specifying file Criteria for Partitioned files below.

All general attributes of physical file definitions are described in the section Adding, Modifying and Purging Physical Files.

Specifying ADASTAR Attributes

To specify or modify the ADASTAR attributes of a physical file, select the topic ADASTAR attributes in the Additional Attributes window. ADASTAR attributes is not contained in the Additional attributes window if no association to a database exists or the logical ADASTAR type is simple.

```

16:58:35          ***** P R E D I C T 4.2.1 *****          2001-11-12
                    - Modify ADABAS attributes -
File ID ..... PD-A-EXP                               Modified 2001-10-28 at 14:24
Type ..... ADABAS, Expanded file                       by PD
in database ..... PD-AAA (PDBnr: 28)

ADASTAR attributes
Phys. ADASTAR type .....* E   Expanded file
Related master file
  Phys. database number ..* 0
  Phys. file number .....* 0

Loading attributes
Min ISN ..... 1
Max ISN .....
One AC extent ..... Y (Y,N)
    
```

Parameters													
Type	<p>The ADASTAR types to be assigned to a physical file. The table below shows which types of physical ADASTAR types apply to different logical types:</p> <table border="1"> <thead> <tr> <th>Logical ADASTAR type</th> <th>Physical ADASTAR type</th> </tr> </thead> <tbody> <tr> <td>simple</td> <td>simple</td> </tr> <tr> <td>expanded</td> <td>expanded, simple</td> </tr> <tr> <td>partitioned</td> <td>partitioned, partitioned master*, partitioned replicated*, simple</td> </tr> <tr> <td>replicated</td> <td>replicated master**, replicated, simple</td> </tr> <tr> <td>PROPAGATOR</td> <td>PROPAGATOR master, PROPAGATOR replicated, simple</td> </tr> </tbody> </table> <p>* Any physical file of type partitioned replicated must have an associated physical file of type partitioned master. ** The file with logical ADASTAR type replicated can have at most one physical file of type replicated master; its other physical files must have type replicated.</p>	Logical ADASTAR type	Physical ADASTAR type	simple	simple	expanded	expanded, simple	partitioned	partitioned, partitioned master*, partitioned replicated*, simple	replicated	replicated master**, replicated, simple	PROPAGATOR	PROPAGATOR master, PROPAGATOR replicated, simple
Logical ADASTAR type	Physical ADASTAR type												
simple	simple												
expanded	expanded, simple												
partitioned	partitioned, partitioned master*, partitioned replicated*, simple												
replicated	replicated master**, replicated, simple												
PROPAGATOR	PROPAGATOR master, PROPAGATOR replicated, simple												
Related master file	Has to be specified for physical files of the types partitioned replicated. For files of type replicated the related master file is displayed (if any is specified).												
Loading attributes													
Min ISN	ADALOD LOAD parameter MINISN												
Max ISN	ADALOD LOAD parameter MAXISN												
One AC extent	ADALOD LOAD parameter NO AC EXTENSION.												

Specifying File Criterion for Partitioned Files

The file criterion is used as follows:

- For files with logical ADASTAR type partitioned, the file criterion determines how data is split across several physical files.
- For any other type of file, the file criterion validates input to the file. Input that does not meet the specified criteria is rejected.

Any field of a file can be checked against up to ten validation criteria or the ISN can be taken as the distribution criterion. An example:

The field zip_code is evaluated. Only if a record has a zip_code starting with 6 (identifying the area around Frankfurt/Main) is a record to be included into the file. The respective input is shown in the diagram below.

```

08:14:12          ***** P R E D I C T 4.2.1 *****          2001-11-04
                    - Modify ADABAS attributes -
File ID ..... PD-A-PAR          Modified 2001-11-04 at 08:13
in database ..... PD-A0          by SMR
PDBnr ..... 16      PFnr ... 151

Ty Distribution key          F Length Occ  D U DB N NAT-1
----- *-----
ZIP-CODE                    N 5.00          AH N

1 Operator ..* GE Value format ..* N Length .. 5
Value ..... 60000          Zoom: N

Connected via ..S
2 Operator ..* LT Value format ..* N Length.. 5
Value ..... 70000          Zoom: N

Connected via ..*
3 Operator ..* Value format ..* Length ..
Value .....          Zoom: N
Scroll to:

EDIT: Owner: N Desc: N * Field list: Y
    
```

Parameters	
Distribution Key	The field that is evaluated according to the subsequent validation criteria. By entering an asterisk, a list of all fields contained in the logical file plus the ISN is displayed for selection.
Operator	Valid values: EQ Equal GT Greater GE Greater equal LT Less LE Less equal
Value format	Valid values: A Alphanumeric B Binary H Binary X Binary N Numeric
Length	The value will be evaluated to this length.
Value	The contents of the field has to match this value according to the operator specified.
Zoom	Y will display a window to enter a validation value of up to 253 characters. A validation value of up to 50 characters can be entered without Zoom.
Connected via	The next validation criterion to be specified is logically connected as follows: O or S Thru

Including the Definition in the STARTAB Table

To access data in physical files with Adabas Star, the file definitions must be contained in the ADASTAR translation table of the Adabas Star translator database. Exactly one ADASTAR translator database must exist in any Virtual Machine (see also description of the ADASTAR parameter in section Defining a Database).

ADASTAR translation tables can be generated from STARTAB elements defined in Predict. See ADASTAR Translation Table in section **Generation** in the **External Objects in Predict documentation**.

STARTAB elements are defined with the file maintenance functions Add/Modify STARTAB elements. The function uses the following screen:

```

12:51:47          ***** P R E D I C T 4.2.1 *****                2001-07-01
                    - Add STARTAB element -
File ID ..... JPE340                                     Added 2000-07-01 at 12:51
Type ..... ADABAS, Simple file                           Modified

Network .....*
User ID .....*
ADASTAR number ..... L-DBnr .. 0   L-Fnr .. 0
Simple ..... Y (Y,N)

                                Database                PDBnr   PFnr   ADASTAR type
                                *-----*              *-----*   *-----*
1
    
```

Parameters	
Type	Type of the logical file (for example Adabas, partitioned). A read-only field. Note: The subsequent parameters Network, User ID and ADASTAR number can be specified when adding a STARTAB element. When modifying a STARTAB element, these fields are read-only.
Network	The STARTAB element is available throughout the given network.
User ID	The STARTAB element can be used exclusively by the given user. If, for example, a data administrator wants to access a file for administration purposes, he might create a STARTAB element for his privileged use.
ADASTAR number	Identifies the file uniquely throughout a network.
L-DBnr L-Fnr	The ADASTAR number is calculated from the L-DBnr (logical database number) and the L-Fnr (logical file number) using the following algorithm: ADASTAR number = L-DBnr * 256 + L-Fnr Either the L-DBnr and L-Fnr or the ADASTAR number must be entered. Valid values: 256 < ADASTAR number < 65280 0 <= L-Fnr < 256 0 < L-DBnr < 255
Simple	Y Only physical files of type simple can be accessed with this STARTAB element. N Physical files of all other suitable types can be accessed with this STARTAB element. Which types are suitable depends on the logical ADASTAR type of the file. See Specifying ADASTAR Attributes.

ADASTAR Key

The STARTAB element attributes Network, User ID and ADASTAR number together identify how a STARTAB element can be used.

These attributes are also referred to as the ADASTAR Key. The following rules apply:

- User ID and ADASTAR number must be unique for each STARTAB element within each network.
- If the parameter Unique DBnr/Fnr in the Predict defaults is set to Y, User ID and ADASTAR number must additionally be unique throughout all networks.

Note:

The ADASTAR key is calculated internally and is not displayed by Predict.

Retrieving Information on the Use of ADASTAR Numbers

The function ADASTAR number (code N) in the Network Retrieval Menu can be used to determine how ADASTAR numbers are referenced in databases, physical files and STARTAB elements. See section Network in the **Predefined Object Types in Predict documentation**.

Generating, Incorporating, Comparing and Maintaining Data Definitions under Adabas Star

Predict generation, incorporation and comparison functions can be applied to data definitions under Adabas Star. The following functions are designed especially for maintaining ADASTAR translation tables:

- Generation of ADASTAR translation tables (command: GENERATE STARTAB)
- Incorporation of entries in ADASTAR translation tables as STARTAB elements of Predict file objects of type A with the function Incorporate Adabas C File. Incorporating STARTAB elements requires that either a Predict file object for the implemented physical file does not exist, or an existing Predict file object has the correct physical ADASTAR type.
- Comparison of ADASTAR translation tables with Adabas file definitions in Predict (command: COMPARE STARTAB).

For detailed descriptions of the above options, see the respective parts of sections Generation and Incorporation and Comparison in the **External Objects in Predict documentation**.

Determining the Adabas Star Translator Database

Predict needs to know which database serves as the Adabas Star translator database for the current Natural session to correctly execute generation, incorporation, comparison and some special functions that access data definitions and data under Adabas Star.

Predict determines the Adabas Star translator database as follows:

- In a first step, all Predict database objects linked to the Predict virtual machine object which is the current VM are checked. If any of these database objects has the ADASTAR parameter set to Y, Predict checks whether the corresponding implemented Adabas database does in fact serve as the translator database.
- If no Predict database object with the ADASTAR parameter set to Y is found, or if the database object with the ADASTAR parameter set to Y does **not** serve as the translator database, Predict checks all databases of the Natural system files FUSER, FNAT and FDIC.

Note:

It is important to specify correctly the current VM as the virtual machine containing the Adabas Star translator database! If the current virtual machine is not correctly specified, all Predict functions accessing data definitions under Adabas Star are subject to failure.

See ADASTAR Parameter in section Defining a Database and description of parameter Current virtual machine in section Customizing Predict with Profiles in section **User Interface** in the **Introduction to Predict documentation**.