

DDM Services

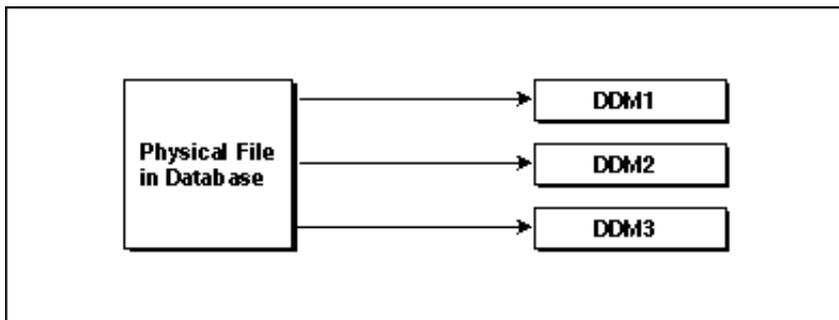
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DDMs (Data Definition Modules)

For Natural to be able to access a database file, a logical definition of the physical database file is required. Such a logical file definition is called a *DDM* (data definition module).

The DDM contains information about the individual fields of the file - information which is relevant for the use of these fields in a Natural program. A DDM constitutes a logical view of a physical database file.

For each physical file of a database, one or more DDMs can be defined.



The Natural Programming Guide describes the use of DDMs in more detail.

A DDM must be created and cataloged in order for the corresponding file to be available for a Natural program. The DDM Services function is used to create and maintain DDMs.

Invoking DDM Services

To invoke DDM Services, select "Services" on the Natural Main Menu or enter SYSDDM in the direct command window.

A selection window is then displayed, from which you select "DDM Services".

The DDM Services menu is then displayed:

```

2001-10-25                DDM Services                Library : SYSTEM
14:26:25                  V 5.1.1 Software AG 2001    DBID   :
User : SAG                 FNR                   :
.....
·  Library                DDM Maintenance          Services Profile          Quit      ·
.....

```

Selecting "Quit" terminates the DDM Services and returns you to the Natural Main Menu.

The remainder of this section is broken up into the following sections:

- Accessing Libraries
- Creating DDMs
- Maintaining DDMs
- Services Profile.

Accessing Libraries

Just like Natural objects, DDMs are contained in libraries. To create a new DDM or maintain an existing one, you must first log on to the library where the new DDM is to be created or where a DDM already exists.

To do so, you select "Library" on the DDM Services menu. A list of all available libraries is then displayed:

```

2001-10-25                DDM Services                Library : SYSTEM
14:29:06                  V 5.1.1 Software AG 2001    DBID   :
User : SAG                 FNR           :
.....
.  Library                DDM Maintenance          Services Profile          Quit      .
.....
.....
.  <LOGON>                .
.  DEMO                    .
.  DEMO-1                  .
.  ORD-EXAM                .
.  PRE                     .
.  SYSEXP                  .
.  SYSEXRM                 .
.  SYSTEM                  .
.....

Log on to DDM library
    
```

There are three ways to proceed:

- select the desired library from the list (cursor selection);
- enter a library's first letter to display only libraries beginning with this letter and then select the desired library from the list;
- select <LOGON> and then enter the name of the desired library.

Creating DDMs

There are two ways to create a new DDM:

- copy an existing DDM to another name;
- add a new DDM.

This section describes how to add a new DDM. For instructions on how to copy an existing DDM, see Copying DDMs.

To create a new DDM, first ensure that you are logged on to the correct library (Accessing Libraries). Select "DDM Maintenance" on the DDM Services menu. A list is displayed containing all available DDMs in the selected library:

```

2001-10-25          DDM Services          Library : SYSTEM
14:35:57           V 5.1.1 Software AG 2001 DBID   :
User : SAG                FNR      :
.....
.  Libraries          DDM Maintenance          Services Profile          Quit
.....
.....
.  <CREATE>          .
.  ACTIO            .
.  AEH-BEDIENSTETER .
.  AEH-HDAT         .
.  EMPLOYEES        .
.  FUNC             .
.  MAP              .
.  OBJ              .
.  PERSONNEL        .
.  VEHICLES         .
.....

Select DDM
    
```

Select <CREATE> from the top of the list. The following window is displayed:

```

2001-10-25          DDM Services          Library : SYSTEM
14:39:57           V 5.1.1 Software AG 2001 DBID   :
User: SAG                FNR      :
.....
.  Library          DDM Maintenance          Services Profile          Quit   .
.....
.....
.  <CREATE>          .
.  EMPLOYEES        .
.....
.  DBID            1          .
.....
Func
Map
    
```

In this window, you enter the database ID (0 - 65535, except 255) of the file/table for which a DDM is to be created. If "0" is specified, the database ID specified in the UDB parameter of the Natural parameter module is used.

If the specified DBID identifies an Adabas database, the following window is displayed:

```

2001-10-25          DDM Services          Library: SYSTEM
14:47:12           V 5.1.1 Software AG 2001 DBID  :
User: SAG          FNR  :
.....
.  Library          DDM Maintenance          Services Profile          Quit  .
.....
.  <CREATE>          .
.  EMPLOYEES          .
.....
..... Create Adabas DDM .....
.  FNR          1          .
.  DDM Name          .
.....
Map
    
```

In this window, you enter the file number (1 - 5000) of the file for which a DDM is to be created and the name to be assigned to the DDM.

If a database file exists, it will be read into the DDM editing area. You can then edit the DDM (as described under Editing DDMs).

Note:

If the corresponding database is not active, an appropriate error message is issued, but you can still read the DDM into the editing area by pressing ENTER.

If the specified DBID identifies an SQL database, the following window is displayed:

```

2001-10-25          DDM Services          Library: SYSTEM
14:56:08           V 5.1.1 Software AG 2001 DBID  :
User: SAG          FNR  :
.....
.  Library          DDM Maintenance          Services Profile          Quit  .
.....
.  <CREATE>          .
.  EMPLOYEES          .
.  EMPLTEST          .
.....
.....Select SQL Table.....
.  Table Owner:*          .
.  Table Name  :*          .
.....
    
```

In this window, you enter the owner and name of the table for which a DDM is to be created.

If such a table exists, a DDM is created from this table. If no such table exists or if you specify an asterisk (*) as table owner and/or table name, a selection list is displayed from which you can select the desired SQL table.

```

2001-10-25          DDM Services          Library: SYSTEM
15:02:23           V 5.1.1 Software AG 2001 DBID  :
User: SAG          FNR  :
.....
.  Library          DDM Maintenance          Services Profile          Quit  .
.....
..... Import SQL Table Contents .....
. Table Owner          Table Name          Type  .
. =====
. DEMO                 AUTOMOBILES
. DEMO                 ENMPLOYEES
. DEMO                 SALARY
. SAG                  ALLDATA
. SAG                  TEST
    
```

A DDM is generated from the selected table and read into the DDM editing area. The DDM name corresponds to the combination of table owner and table name, for example: SAG-TEST.

Note:

With the Natural program DDMGEN you can generate several DDMs in a particular library without using the editor.

Data-Type Conversion

When a Natural program accesses data in any database, RDBMS-specific data types are converted to Natural data formats, and vice versa. The tables in this section show how Natural data formats correspond to data types in the following RDBMSs:

- Adabas
- Adabas D
- Adabas SQL Server
- DB2
- INFORMIX
- INGRES
- ORACLE
- SYBASE and Microsoft SQL Server

Adabas

Adabas Data Type	Natural Format/Length
A (n) alphanumeric	A (n)
B (n) binary	B (n)
F (n) fixed but: F8	I (n) I4
G (n) float	F (n)
P (n) packed	P (2 x n - 1)
U (n) unpacked	N (n)

Adabas D

RDBMS Data Type	Natural Format/Length
boolean	L
char (<i>n</i>)	<i>An</i>
date	A10
fixed (<i>p,q</i>)	<i>Np-q,q</i>
float	F8
integer	I4
long	A, DYNAMIC
long varchar	A, DYNAMIC
smallint	I2
string	<i>An</i>
time	A8
timestamp	A26
varchar	<i>An</i>

Adabas SQL Server

RDBMS Data Type	Natural Format/Length
char(5)	A5
char(253)	A253
decimal(5)	N5
decimal(10.4)	N(6.4)
double precision	N(10.6)
float(1...21)	N(2.6)
float(22...53)	N(10.6)
integer	I4
numeric(5)	N5
numeric(10.4)	N(6.4)
real	F4
smallint	I2

DB2

RDBMS Data Type	Natural Format/Length
date	A10
decimal(5)	N5
decimal(10.4)	N(6.4)
fixed character(5)	A5
float	F n
graphic	2* A_n
longvar	A, DYNAMIC
longvarg	A, DYNAMIC
large integer	I4
scientific notation	N(10.6)
small integer	I2
special data	A253
system date and time	A10
time	A8
timestmp	A26
varchar	A_n
varg	2* A_n

INFORMIX

RDBMS Data Type	Natural Format/Length
byte	A56
char(n)	A_n
date	A10
datetime	A26
decimal(p,q)	$N_{p-q,q}$
float	F8
integer	I4
interval	A17
money	N(14.2)
real	F4
serial	I4
smallfloat	F4
smallint	I2
text	A_n
varchar(n)	A_n

INGRES

RDBMS Data Type	Natural Format/Length
byte varying	B <i>n</i>
c(<i>n</i>)	A <i>n</i>
char (<i>n</i>)	A <i>n</i>
date	A10
double precision	F8
float	F8
float4	F4
integer	I4
integer1	I1
long byte	B, DYNAMIC
long varchar	A, DYNAMIC
money	N(12.2)
object_key	B16
real	F4
smallint	I2
table_key	B8
text (<i>n</i>)	A <i>n</i>
varchar (<i>n</i>)	A <i>n</i>

ORACLE

RDBMS Data Type	Natural Format/Length
char (<i>n</i>)	<i>An</i>
date	A10
decimal (<i>p,q</i>)	<i>Np-q,q</i>
double precision	F8
float	F4
integer	I4
long	A, DYNAMIC
long raw	B, DYNAMIC
number	<i>Nn</i>
nvarchar2	<i>An</i>
raw (<i>n</i>)	<i>Bn</i>
real	F4
rowid	<i>An</i>
smallint	I2
varchar	<i>An</i>
varchar2 (<i>n</i>)	<i>An</i>

SYBASE and Microsoft SQL Server

RDBMS Data Type	Natural Format/Length
binary (<i>n</i>)	B <i>n</i>
bit	N1
char (<i>n</i>)	A <i>n</i>
datetime	A26
float	F8
image	B126
int	I4
money	N(15.4)
nchar (<i>n</i>)	A <i>n</i>
nvarchar (<i>n</i>)	A <i>n</i>
real	F4
smalldatetime	A26
smallint	I2
smallmoney	N(6.4)
text	A <i>n</i>
timestamp	B8
tinyint	I2
varbinary (<i>n</i>)	B <i>n</i>
varchar (<i>n</i>)	A <i>n</i>

If the length of the database column exceeds the maximum length of the corresponding Natural format, a multiple field is generated.

Editing DDMs

To modify a DDM, enter "E" next to the DDM to be edited. The DDM will then be read into the work area, where you can edit it by using the DDM editor.

DDM Editor

The DDM editor is used to edit the DDM currently located in the work area.

When the specified database is active and a database file with the specified file number exists, the contents of this database file are loaded in the work area and displayed on the screen; if not, an empty screen is displayed.

```

2001-10-25                DDM Services
15:30:47                  V 5.1.1 Software AG 2001                Line: 1
DBID: 1                   FNR: 1                DDM: EMPLOYEES-FILE    DEF.SEQ.:
  C  T   L Name                      F Length S D
      1 PERSONNEL-ID                  A      8   D
      G   1 FULL-NAME
          2 FIRST-NAME                 A     20  N
          2 MIDDLE-NAME                A     20  N
          2 NAME                        A     20  D
          1 MAR-STAT                    A      1  F
          1 SEX                         A      1  F
          1 BIRTH                       D      6   D
      G   1 FULL-ADDRESS
      M   2 ADDRESS-LINE                 A     20  N
          2 CITY                        A     20  N D
          2 POST-CODE                   A     10  N
          2 COUNTRY                      A      3  N
      G   1 TELEPHONE
          2 AREA-CODE                   A      6  N
          2 PHONE                        A     15  N
          1 DEPT                         A      6   D
          1 JOB-TITLE                    A     25  N D
      P   1 INCOME
          F1 Help  F2 Choice F3 Stow+Exit  F10 Stow  F11 Check
          F12 DB-Short-Names  F13 Modify Header  F14 Show Ext Field  F15
    
```

Press F1 to display the editor help information: Press F1 once to invoke the field help key settings; press F1 twice to invoke the editor help key settings.

Header of the DDM Editor

The header of the DDM editor displays the following information:

Field Name	Description
DBID	The database where the file is stored.
FNR	The file number.
DDM	The name of the DDM.
Line	The current edit line number.
Default Sequence	Logical database short name.

Attributes of a DDM

The DDM itself comprises field-definition attributes which can be entered or modified. They are described in turn below.

C Attribute of a DDM

Command option:

Value	Description
<i>blank</i>	No command
D	Delete line
I	Insert line
X	Start mark block
Y	End mark block
H	Hide block
C	Copy marked block
M	Move marked block

T Attribute of a DDM

Field type:

Value	Description
<i>blank</i>	Elementary field
G	Group header
M	Multiple-value field
P	Periodic group header
*	Comment line

DB Attribute of a DDM

The Adabas short name, which can be used to reference the field.

This name can be edited. The Adabas short names list can be displayed and/or hidden using F12 (toggle switch).

Note:

If you create a new DDM field and the database short names are switched OFF, the editor generates a new "unused" short name for the field; this means that for this field there is no link between the database file and the DDM. Therefore, if you have to create a new DDM field, use the INSERT command to link the new field to the database file.

Note for ENTIRE DB:

The short names represent 5-digit ISNs, which can be displayed but cannot be modified.

L Attribute of a DDM

Level number assigned to the field. Valid level numbers are 1 - 7. Level numbers must be specified in consecutive ascending order.

Name Attribute of a DDM

A user-defined field name (3 - 32 characters). This is the field name used in Natural programs to reference the field.

Note:

In SQL DDMs, the field name can be from 1 to 32 characters.

Format and Length Attributes of a DDM

The format and length of the field:

Value	Description
<i>blank</i>	Group
A	Alphanumeric (maximum length 253)
B	Binary (maximum length 126)
D	Date
F	Floating point (4 or 8 bytes)
I	Integer (1, 2 or 4 bytes)
L	Logical
N	Unpacked (maximum length 29)
P	Packed (maximum length 29)
T	Time

The standard length of a field can be overridden in a Natural program. For numeric fields (format N), the length is specified as "*nm.m*", where "*nm*" represents the number of digits before the decimal point and "*m*" represents the number of digits after the decimal point.

Only for SQL DDMs: In the length input field, you can specify either the field length as a numeric value or enter the keyword "DYNAMIC" to specify that the field length is variable.

For further information, see Large and Dynamic Variables/Fields.

S Attribute of a DDM

Null value suppression:

Value	Description
<i>blank</i>	Normal Adabas compression
F	Indicates that the field is defined with the Adabas fixed storage option; that is, no suppression takes place.
L	Indicates that a linkage attribute is defined for this field (applies to ENTIRE DB only)
N	Indicates that the field is defined with the Adabas null value suppression option. This means that null values for the field are not stored in the inverted list and will not be returned when the field is used to construct a basic search criteria (WITH clause of a FIND statement), in a HISTOGRAM statement, or in a READ LOGICAL statement.
M	Indicates that the field is defined with the SQL null-value option "not null". The Remarks column for this field contains "NN NC" (not null, not counted). Below this field, the corresponding null-indicator field is listed.

D Attribute of a DDM

Descriptor:

Value	Description
<i>blank</i>	No Adabas descriptor is to be used.
D	The field is an Adabas descriptor. Value lists are created and maintained for this field by Adabas, enabling this field to be used as a search criterion in a FIND statement, as a sort key in a FIND statement, or to control logical sequential reading in a READ statement.
H	The field is an Adabas hyperdescriptor. A hyperdescriptor is based on an Adabas user exit; for Natural, it provides the same functionality as a phonetic descriptor (see below).
N	Indicates that the field is defined as a non-descriptor. A non-descriptor is not a descriptor, but can be used as a search field for a so-called non-descriptor search.
P	The field is an Adabas phonetic descriptor. A phonetic descriptor allows the user to perform a phonetic search on a field (for example, a person's name). A phonetic search results in the return of all values which sound similar to the search value.
S	The field is an Adabas subdescriptor or superdescriptor. If you select the "S", information about the contents of the superdescriptor or subdescriptor is displayed.

Editor Commands

Editor commands can be issued either from the menu bar by selecting "Commands" or else via F key.

Several editor commands are available via function keys. To display the function-key assignments, you press F1 twice.

The following function-key assignments apply:

Key	Function
F1	Displays field-level help information. Press F1 again to display general help information.
F2	Produces a selection list for a field. You can then select one of the values listed, or you can enter the first character of an entry.
F11	Checks the DDM for duplicate names and valid field entries.
F12	Switches the display of Adabas field short names on or off (toggle switch).
F13	Changes the DBID and file number (FNR) of the DDM (shown at the top of screen, default sequence).
F14	Invokes extended field editing. Press F15 to edit information contained in the resulting window.
F15	Edits information contained in extended field editing window.

After editing is completed, you press F3 or F10 to stow (that is, save *and* catalog) the DDM.

Extended Field Editing

The DDM editor can also be used to enter/modify field definitions.

The extended editing mode is used to specify default options for field headers and edit masks as well as remarks to be applied when the field is used in a DISPLAY or INPUT statement.

The extended editing mode is invoked by pressing F14. When you press F15, you can edit the information contained in the resulting window; F14 has a toggle effect (ON/OFF):

```

2001-10-25                DDM Services
15:38:07                  5.1.1 Software AG 2001                               Line: 1
DBID: 1  FNR: 1  DDM: EMPLOYEES-FILE                DEF.SEQ.:
  C  T      L Name                                F Length S D
      1 PERSONNEL-ID                            A      8   D
  G      1 FULL-NAME
      2 FIRST-NAME                            A     20  N
      2 MIDDLE-NAME                          A     20  N
      2 NAME                                  A     20  D
      1 MAR-STAT                              A      1  F
      1 SEX                                    A      1  F
      1 BIRTH                                  D      6   D
  G      1 FULL-ADDRESS
  M      2 ADDRESS-LINE                        A     20  N
      2 CITY                                  A     20  N D
      2 POST-CODE                             A     10  N
      2 COUNTRY                               A      3  N
  G      1 TELEPHONE
      2 AREA-CODE                             A      6  N
----- Extended Field Information -----
Header   : PERSONNEL-ID
Edit Mask:
Remark   :
F1 Help   F2 Choice  F3 Exit   F4 Delete  F5 Insert  F6 Mark
F7        F8 Copy    F9 Move   F10 Stow   F11 Check  F12 Quit
    
```

The Extended Field Editing information is displayed at the bottom of the screen; it changes, based on the current edit line.

Note for ENTIRE DB:

In addition to Header, Edit Mask and Remark, Linkage information is displayed.

In extended editing mode, the highlighted line can be moved by using UP ARROW and DOWN ARROW keys. The TAB key can be used to move the line downwards.

The extended field editing screen is terminated when ENTER is pressed with or without any modifications having been made.

Leaving the DDM Editor

Pressing ESC invokes the following screen:

Commands		Misc		Quit	
15:44:25		V 5.1.1 Software AG 2001		Line: 1	
DBID: 1 FNR: 1 DDM: EMPLOYEES-FILE				DEF.SEQ.:	
C	T	L Name	F	Length	S D
		1 PERSONNEL-ID	A	8	D
	G	1 FULL-NAME			
		2 FIRST-NAME	A	20	N
		2 MIDDLE-NAME	A	20	N
		2 NAME	A	20	D
		1 MAR-STAT	A	1	F
		1 SEX	A	1	F
		1 BIRTH	D	6	D
	G	1 FULL-ADDRESS			
	M	2 ADDRESS-LINE	A	20	N
		2 CITY	A	20	N D
		2 POST-CODE	A	10	N
		2 COUNTRY	A	3	N
	G	1 TELEPHONE			
		2 AREA-CODE	A	6	N
		2 PHONE	A	15	N
		1 DEPT	A	6	D
		1 JOB-TITLE	A	25	N D
	P	1 INCOME			
F1 Help		F2 Choice		F3 Stow+Exit	
		F10 Stow		F11 Check	
Select a Command					

Commands

If you select "Commands" and press ENTER, the following options appear:

Command	Function
CATALOG	Stores the file description in the database in object form.
CHECK	Checks the syntax for correctness.
SAVE	Stores the file description in the database in source form.
SCAN	Scans for a field name within the file description.
STOW	Stores the file description in the database in both source and object form.

Misc

If you select "Misc" and press ENTER, the following options appear:

Option	Function
DB Short Names (ON/OFF)	If you select this option and press ENTER, a toggle function is invoked, which shows the DB short names which were not displayed previously and vice versa.
Modify DDM Header	Enables modification of DDM editor header information.
Show Extended Field	Displays extended field window.
Edit Extended Field	Enables editing of extended field window.
Show Coupled Files	If you select this option, all files physically coupled to the displayed DDM are listed together with the short names of the descriptors used for coupling.

Quit

If you select "Quit" and press ENTER, the following two options appear:

Option	Function
EXIT	Stows the DDM before leaving the DDM editor.
QUIT	Leaves the DDM editor without stowing the DDM.

Listing DDMs

To display a DDM, enter "L" next to the DDM to be listed. The selected DDM is then displayed as shown in the example below:

```

.....List: EMPLOYEES.....
. 0001 DB: 001 FILE: 001 - EMPLOYEES                                DEFAULT SEQUENCE.
. 0002
. 0003 T L DB Name                                                F Leng S D Remark
. 0004 - - -- -----
. 0005 1 AA PERSONNEL-ID                                           A 8 D
. 0006 HD=PERSONNEL/ID
. 0007 * C>NNNNNNN
. 0008 * C=COUNTRY
. 0009 G 1 AB FULL-NAME
. 0010 2 AC FIRST-NAME                                             A 20 N
. 0011 2 AD MIDDLE-I                                             A 1 N
. 0012 2 AE NAME                                                  A 20 D
. 0013 1 AD MIDDLE-NAME                                           A 20 N
. 0014 1 AF MAR-STAT                                              A 1 F
. 0015 HD=MARITAL/STATUS
. 0016 * M=MARRIED
. 0017 * S=SINGLE
. 0018 * D=DIVORCED
.....
    
```

Renaming DDMs

To rename a DDM, enter "N" next to the DDM the be renamed. A window is then displayed in which you enter the new name of the DDM:

```

2001-10-25                DDM Services                Library : SYSTEM
15:53:14                  V 5.1.1 Software AG 2001    DBID   : 1
User : SAG                 FNR      : 1
.....
·  Library                DDM Maintenance            Services Profile        Quit      ·
.....
                                <CREATE>  ·
·  N EMPLOYEES  ·
·  PERSONNEL  ·
·  VEHICLES   ·
..... Rename DDM to .....
·
.....
Enter new DDM name

```

Note:

XREF data are taken into account.

Services Profile

When you select "Services Profile", the following window is displayed:

```

2001-10-25          DDM Services          Library : SYSTEM
16:03:10           V 5.1.1 Software AG 2001 DBID   :
User : SAG          FNR                   :
.....
.  Library          DDM Maintenance       Services Profile       Quit  .
.....
. Function Keys .
. Other Definitions .
.....
    
```

Function Keys

With this function, you can assign DDM-editor functions to other function keys.

When you select "Function Keys", the following window is displayed, showing the current function-key assignments:

```

..... Profile settings .....
. Delete           F4           .
. Insert           F5           .
. Mark Block       F6           .
. Unmark Block     F7           .
. Copy             F8           .
. Move             F9           .
.....
    
```

You assign a function to another key as follows:

1. In the above window, you first select the function key to which the function is assigned.
2. Then you *press* the function key to which you wish the function to be assigned.

Note:

It is not possible to assign a function to a key which already has a function assigned to it.

Other Definitions

When you select "Other Definitions", a window is displayed in which you enter "Y" or "N" to determine whether or not the 2-character database short names of the DDM fields are to be displayed in the DDM editor:

Note:

Short names can also be displayed from the editor using F12.

```

..... Profile settings .....
. Display Database short names N .
.....
    
```