Getting started with Morfik: Database programming

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Abstract

In this second article about getting started with Morfik development, the possibilities for database access are examined. Morfik by default uses Firebird as a back-end database engine, but it can access other databases as well, using ODBC.

1 Introduction

Almost all - if not all - web applications will need access to a database of some kind. Recognizing this, the Morfik designers centered the Morfik IDE around this concept: A Morfik application consists of a database with a web front-end. The approach is much that used by Microsoft Access: The design of the database is prominently present in the IDE. The main difference is the use of Firebird as a database back-end, instead of the Microsoft jet engine used in MS-Access.

Firebird is an excellent open source database, which scales well from embedded database to enterprise-level installations. It has an excellent track record of reliability and robustness, with an extreme small installation footprint, and offers virtually 24/7 operation without extensive maintenance: it has been around since the early eighties, under various incarnations. The many third-party tools make it also easy to maintain and design Firebird databases.

These third party tools are strictly speaking not necessary, as the Morfik IDE offers almost full access to the Firebird database.

To demonstrate this, a small database application will be written in Morfik. The application is a Music CD catalogue. It will be centered around 3 tables:

ARTISTS a table with artist names. This will be used as a lookup table for the albums and artists. It contains essentially the name of the artist, and a unique ID.

ALBUMS a table with one record per album. It refers to the `ARTISTS` table for the album Author.

TRACKS a table with the tracks of an album: it refers to the `ALBUMS` table and to the `ARTISTS` table, in case the album has tracks by various artists.

this will be used to code a small application which can be used to manage an album collection.

This application will need several forms:

- A list of artists.
- A list of all albums.
- A form to edit an album.

- A list of tracks per album.

Obviously, also some kind of menu is needed, and possibly also a search form.

2 Architecture

When designing a database application, it is important to keep in mind how Morfik accesses and shows the data in its reports and - more importantly - its forms. Morfik provides two sources of data:

Tables Correspond directly to database tables. A form can link directly to a table: the data of this table will be shown in the form. A filter condition can be specified on the table. The data is then updatable.

Queries It is possible to define (complex) queries in Morfik, and store them with a name. The result of these queries can also be shown in forms or reports.

To display data in a form, the easiest method is to make the form data bound. This means simply that the 'Datasource' property of the form is set to the name of a table or a query, and the same for the controls in the form: each has a 'Datafield' property, which can be set to the name of a field in the datasource of the form: the control will then display the contents of the field instead of some static content.

What happens then depends on the view mode of the form, and this will be explained below.

3 Creating and editing tables

The first step in creating a database-driven application is designing the database, which means creating the tables that make up the database. As usual, the Morfik IDE offers a wizard to do this, or the table can be created directly in design view.

As stated in the introduction, the CD collection application will consist of 3 tables. The first table is the artist table, with the following fields:

A_ID an autonumber field, which will be used to uniquely identify artists.

A_NAME a string field to hold the name of the artist.

A_DESCRIPTION a string field to hold a descriptive text about the artist.

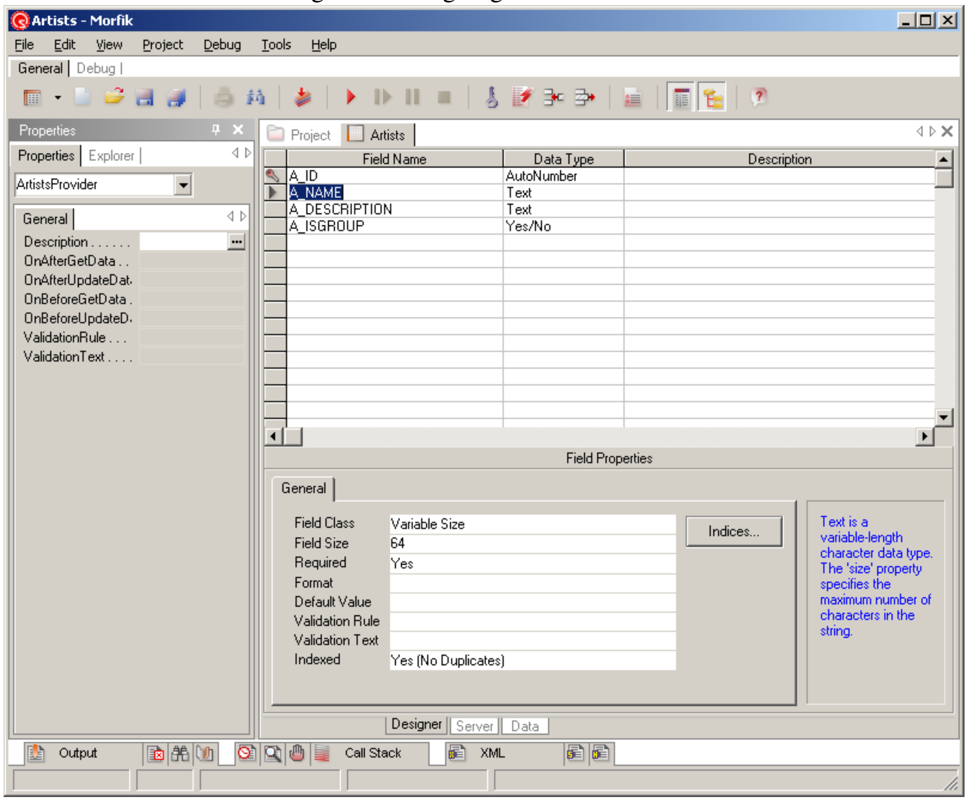
A_GROUP a boolean field which indicates whether this entry denotes a band or a single artist.

Care should be taken when creating tables: all field and table names are created case sensitive by the Morfik IDE: all identifiers are quoted unless typed all uppercase (contrary to the Firebird default, which is case insensitive).

When this table is designed in the Morfik table editor, it will look something like in figure 1 on page 3. Readers familiar with MS-Access or OpenOffice Base will recognize the look and feel of the table editor. Not all field types available in MS-Access are available in Morfik, but most common field types are present. Note that the table name is `Artists`, to demonstrate that the name is indeed case sensitive. The `A_ID` field is made the primary key field, which can be done with a simple click on a button in the toolbar.

To make sure that each artist is entered only once in the `Artists` table, a unique index is created on the `A_NAME` field. This can be done in the table index editor, as shown in figure

Figure 1: Designing the Artists table

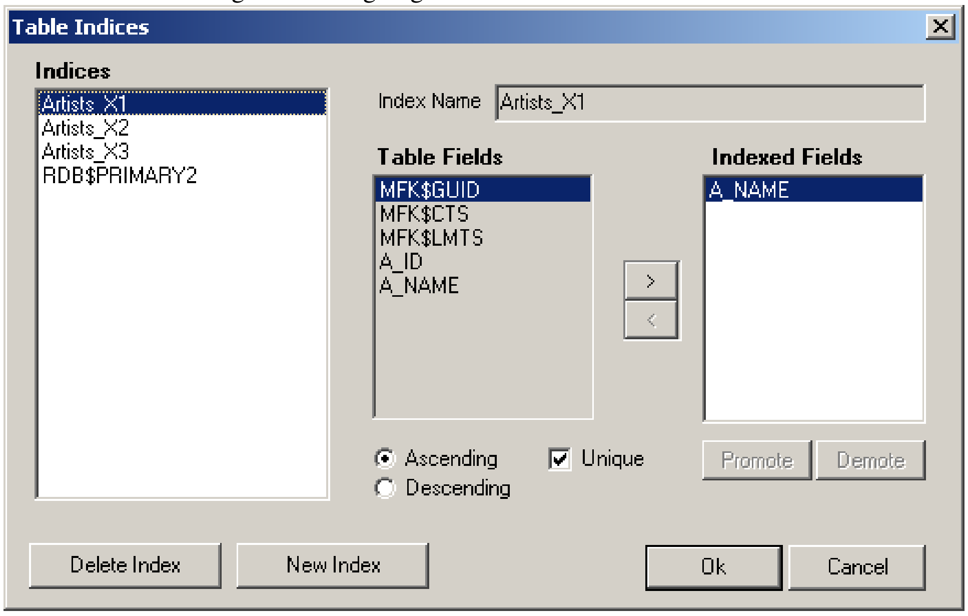


Field Name	Data Type	Description
A_ID	AutoNumber	
A_NAME	Text	
A_DESCRIPTION	Text	
A_ISGROUP	Yes/No	

Field Class	Variable Size
Field Size	64
Required	Yes
Format	
Default Value	
Validation Rule	
Validation Text	
Indexed	Yes (No Duplicates)

Text is a variable-length character data type. The 'size' property specifies the maximum number of characters in the string.

Figure 2: Designing the indexes on the Artists table



Indices
- Artists_X1
- Artists_X2
- Artists_X3
- RDB$PRIMARY2

Index Name: Artists_X1

Table Fields
- MFK$GUID
- MFK$CTS
- MFK$LMTS
- A_ID
- A_NAME

Indexed Fields
- A_NAME

[✓ Ascending] Descending

[✓ Unique]

2 on page 3. In the table index editor, fields are shown which are not visible in the table editor: they are fields that are added to every table which Morfik creates:

MFK$GUID a unique GUID for each record is created.

MFK$CTS the create timestamp of the record (hence CTS) is the time the record was created.

MFK$LMTS the last modification timestamp of the record (hence LMTS) is the time the record was last updated.

These fields are maintained using some triggers in the Firebird database, which are also automatically maintained by the Morfik IDE.

The `ALBUMS` table has slightly more fields than the `Artists` table:

B_ID An autonumber, which forms the unique ID for each album. This is the primary key.

B_TITLE The title of the album. A text field.

B_DESCRIPTION A descriptive text about the album.

B_YEAR An integer field containing the year the album was released.

B_ARTIST_FK An integer field containing the ID of the artist which released the album.

B_FRONTCOVER A picture field containing a picture of the front of the CD box.

B_BACKCOVER A picture field containing a picture of the back of the CD box.

B_DISCID An string field containing the unique disc id which can be used in a CDDB lookup.

The picture field can have 2 types: Linked or Embedded. An embedded picture is stored directly in the database in a blob field. If the field type is Linked, then the image data is stored not in the database, but in the directory where the morfik binary resides. The field in the database will simply contain a link to the external document.

Similarly, the `TRACKS` table can be defined with the following fields:

T_ID The unique ID of the track.

T_NUMBER the track number.

T_TITLE The title of the song.

T_ALBUM_FK The ID of the album of which this track is part.

T_ARTIST_FK The ID of the artist performing the song. By default this will be filled with the artist field of the Album table.

T_DURATIONMIN Duration of the track in minutes.

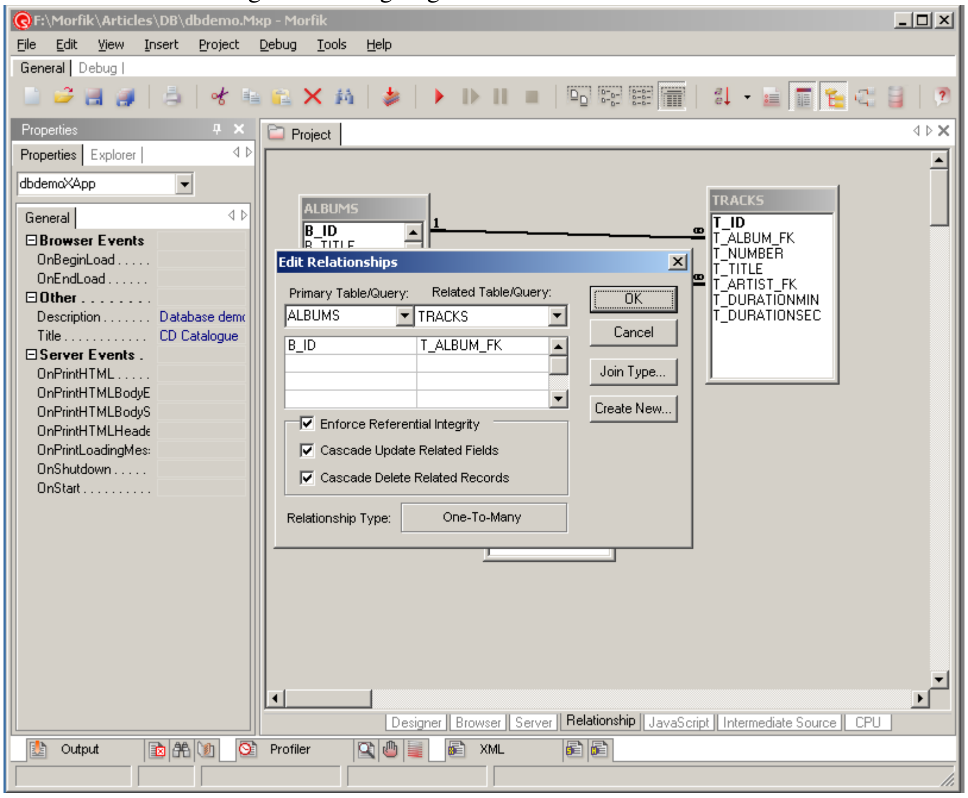
T_DURATIONSEC Duration of the track in seconds.

To make sure that the data in the tables remains consistent, some integrity constraints will be defined between the three tables:

B_ARTIST_FK should always refer to an existing artist record.

T_ARTIST_FK should always refer to an existing artist record.

Figure 3: Designing the relations between tables



Description . . . . Database demo
Title . . . . CD Catalogue

Edit Relationships

Primary Table/Query:	Related Table/Query:
ALBUMS	TRACKS
B_ID	T_ALBUM_FK

☑ Enforce Referential Integrity
☑ Cascade Update Related Fields
☑ Cascade Delete Related Records

Relationship Type: One-To-Many

T_ALBUM_FK should always refer to an existing album record. Additionally, when the album is deleted from the database, all tracks should be deleted as well.

Defining these integrity constraints can be done in the 'Relationships' tab of the project explorer: there the relations (foreign keys) between the various tables can be defined. To define a relation between 2 tables, both tables must be added to the relations display: this is done with the context menu.

To define a relation between 2 tables (say `T_ALBUM_FK` pointing to `B_ID`), the foreign key field `T_ALBUM_FK` can be dragged from table `TRACKS` and dropped on the `B_ID` field in table `ALBUMS`. Then the relation dialog appears as in figure figure 3 on page 5. Note the options for referential integrity: only if the 'Enforce referential integrity' is checked, a foreign key will be created.

After the tables have been created, the 'Data' tab in the table designer can be used to enter sample data in the table: it's a simple data editing grid.

4 Creating a data-bound form

With the table definitions and their relations in place, it is already possible to design quite powerful forms. As an example, we'll take the form where the list of artists is managed: `ArtistsForm`. In this form, the complete list of artists should be managed. To create this form there are several options: all can be done manually, or the Wizard offered by the Morfik IDE can be used. The wizard takes the programmer through the various stages of the form creation. Since most aspects of creating a data-bound form are covered in the wizard, it's instructive to have a look at the various stages in the wizard. So, for this simple form, the Wizard will be used.

1. A name for the form is asked. This will be `ArtistsForm`.
2. The wizard asks whether the form should have header and footer bands. A footer band is needed, because the form will need a navigator bar, and this is displayed in the footer band. A header band can be added, but is not obligatory.
3. In the next step, the wizard asks if the form should display static content, or whether it should be bound to a datasource. Obviously, it is the latter option that is needed, and the datasource should be the `Artists` table.
4. The wizard then asks what the 'view mode' of the form should be. There are 2 possibilities here:

   Continuous This means that the form as designed will be repeated for a number of records in the datasource. This is currently read-only. Since the artists form needs to be editable, this cannot be used yet. (in the near future, this mode will also be made editable). In a way, in this mode the form resembles a band in a banded report designer.

   Single Form This means that the form will display a single record, and this record can be edited. The navigator bar can be used to navigate through the records in the datasource.

   The viewmode of the form is one of the most important concepts when programming databases in Morfik: it will return on various places. Indeed, for each data bound form the decision whether it is continuous or single must be made.
5. After this, the wizard asks whether the form needs a navigation bar. For a single form, this is easier. There is a customize button which can be used to completely customize the look and feel of the navigation bar: the order and image of the buttons, which buttons should be shown and so on. For the artists form, all buttons are needed: both the navigation buttons and the record manipulation records.
6. As a last step, the wizard asks whether it should add controls to the form. This is the case, and the 'Customize...' button can (and should) be used for this. The resulting dialog looks like figure figure 4 on page 7.

After some tweaking and moving of controls, the form can look like figure 5 on page 7. figure 4 on page 7.

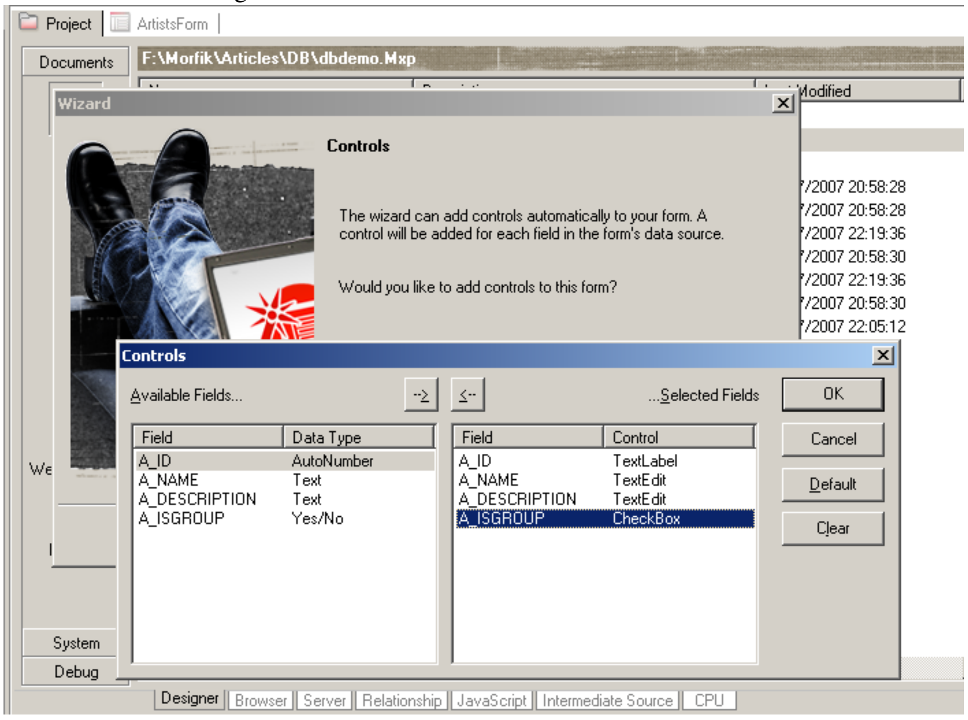
To use this form, the main index form is divided in a heading and 2 subform containers: A sidebar (called leftarea) which will contain a menu form, and the `MainArea` subform container, which will hold the artists form. On the menu form (called `SidebarForm`), a label is added which, when clicked, shows the artists form in the main area:

```
Procedure SideBar.ArtistsClick(Event: TDOMEvent);
Begin
  OpenForm('ArtistsForm', 'Index:MainArea','');
End;
```

Now the project can be run. When the artists label is clicked, the artists form will be shown, and the first record in the table will be displayed. The navigation bar can be used to navigate through the records, and to add, edit or delete records.

The same excercise can be made for the 'All Albums' form. To show the work that the wizard does, this time the form will be made manually. So, a new form is started in design view. The name of the form is `AllAlbumsForm`.

Figure 4: The IDE will create controls for all fields



Controls

The wizard can add controls automatically to your form. A control will be added for each field in the form's data source.

Would you like to add controls to this form?

Controls

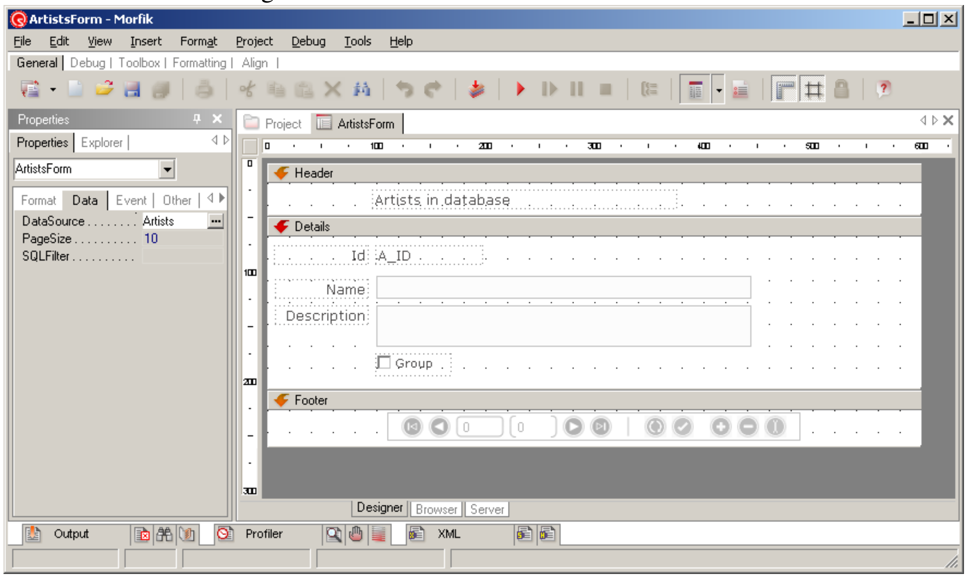
Available Fields...

Field	Data Type
A_ID	AutoNumber
A_NAME	Text
A_DESCRIPTION	Text
A_ISGROUP	Yes/No

...Selected Fields

Field	Control
A_ID	TextLabel
A_NAME	TextEdit
A_DESCRIPTION	TextEdit
A_ISGROUP	CheckBox

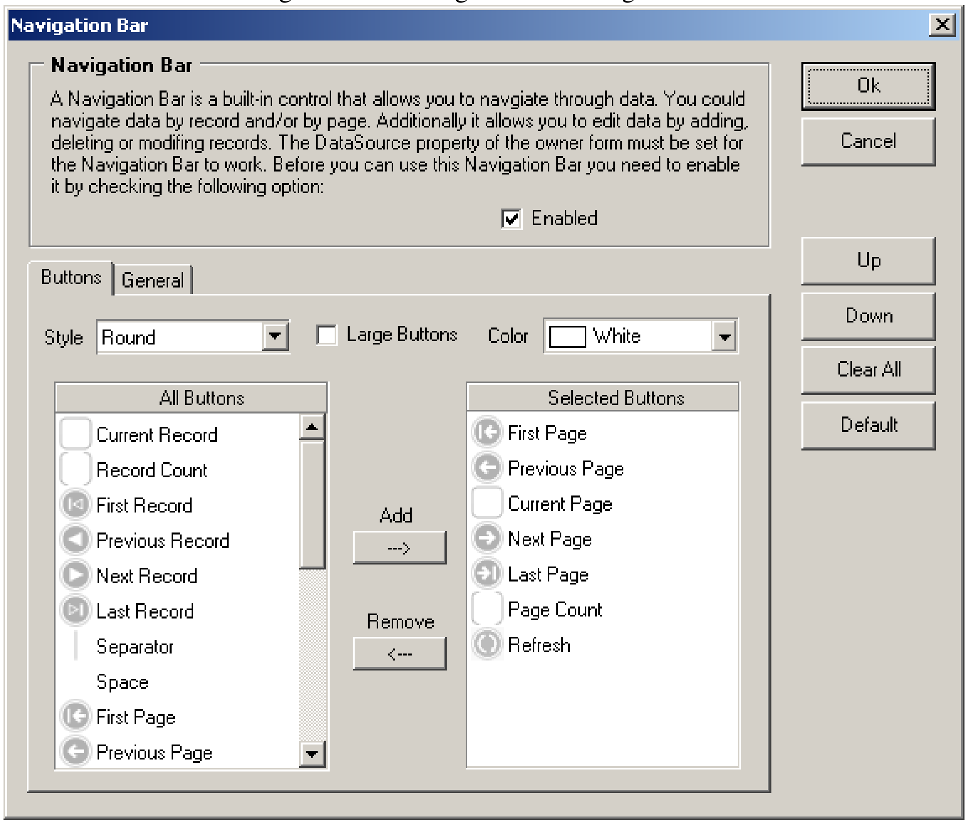
Figure 5: The finished ArtistsForm in the IDE



ArtistsForm

DataSource .... Artists
PageSize 10
SQLFilter ....

Figure 6: The navigation bar configuration



Navigation Bar

Navigation Bar

A Navigation Bar is a built-in control that allows you to navgiate through data. You could navigate data by record and/or by page. Additionally it allows you to edit data by adding, deleting or modifing records. The DataSource property of the owner form must be set for the Navigation Bar to work. Before you can use this Navigation Bar you need to enable it by checking the following option:

☑ Enabled

Buttons | General

Style: Round

☐ Large Buttons

Color: White

All Buttons	Selected Buttons
Current Record	First Page
Record Count	Previous Page
First Record	Current Page
Previous Record	Next Page
Next Record	Last Page
Last Record	Page Count
Separator	Refresh
Space	
First Page	
Previous Page	

In difference with the artists form, the album form will show a list of all albums, with a maximum of 20 per page: This decision makes the form read-only. To do this, the `ViewMode` property of the form is set to `vmContinuous`, the `DataSource` property is set to the `ALBUMS` table, and the `PageCount` is set to 20.

Per record, the following information will be shown:

- The ID. The ID will be clickable, and doing so will take the user to a form where he can edit the album.
- The title of the album.
- The year of the album.
- The description of the album.

Since the form is read-only, all controls will be labels. The ID label will have a slightly different look, and the cursor will change shape, so the user knows it's clickable.

For a nicer appearance, the form will contain a header band, so the header band must be made somewhat larger, so a title text and some column header labels can be put in it.

The navigationbar is not a control by itself as it is in many other RAD environments. Instead, it is a property of the footer band. To configure it, the `NavigationBar` property of the footerband must be edited: A property editor dialog will pop up, looking like figure 6 on page 8.

With this, the form is ready to be used. A menu entry can be added to the sidebar: 'All Albums'. When clicked, similar code is executed as for the artists form:

```
Procedure SideBar.AllClick(Event: TDOMEvent);
Begin
  OpenForm('AllAlbumsForm', 'Index:MainArea','');
End;
```

5 Form parameters

The application has now 2 forms, both based on a table. The artists table can be edited, the Albums table can be displayed, and no code other than menu navigation code has been written yet.

To be able to edit an album (or to add a new album), the `AllAlbumsForm` form is not suitable: it is read only. Therefor, a new form must be made which enables the user to add or edit an album. The `AlbumEditForm` will allow the user to edit or create an album. This will again be a databound form, and it will again be bound to the `ALBUMS` table. But in difference with the `AllAlbumsForm`, the form will have it's `Viewmode` property set to `vmSingle`, so it will show only 1 record at a time.

The design of the form is slightly more complicated than the design of the previous forms: the controls for the title, year, discid and description fields are simple text edit fields, these present no problem. The `B_ARTIST_FK` field is a reference to the `Artists` table. To set it, a combobox control is used. The items in the combobox controls must come from the `Artists` table, so an artist can be selected. To do this, the following properties must be set:

LookupDataSource can be set to the `Artists` table.

LookupDataField is the `A_ID` field. This is the field whose value will be stored in the field edited by the combobox.

LookupTextField is the `A_NAME` field. This is the field whose value will be shown in the combobox.

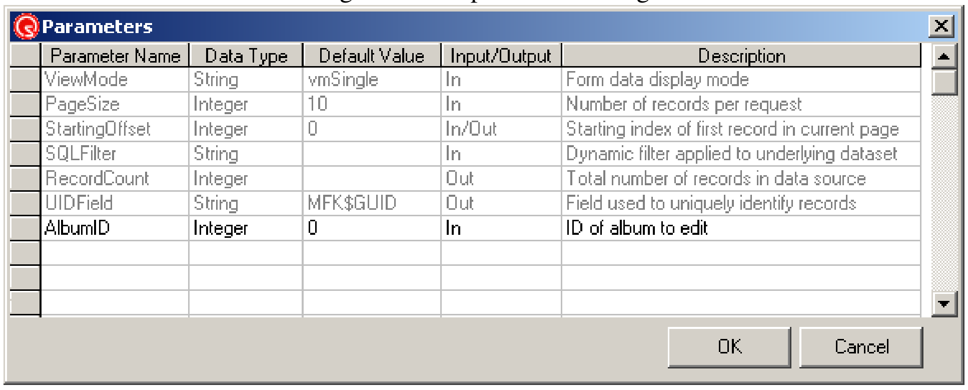
The maximum number of items that will be displayed in the combobox can be set using the `LookupMaxRecords` property.

To show the front and back pictures, and the tracks in the album, a tabcontrol (`TCAlbum`) is placed on the form. It will contain 3 tabs:

1. The first tab will show the tracks of the record. The tracks will be shown in a separate form that will be displayed in a subform container placed on this tab (called `SFTracks`).
2. The second tab will show the front cover picture. To show the picture, an image control is dropped, and it's `DataField` is set to the `B_FRONTCOVER` field. To allow the user to set the picture, a file uploader control is placed below the picture, and it's `DataField` property is also set to `B_FRONTCOVER`: The morfik framework knows how to handle the conversion from file to database field.
3. The third tab will show the back cover picture. The same controls are used as for the front cover field.

The tabs should be big enough to display a CD cover image on 1:1 scale. The form gets still a footer band, and the footer band contains a navigationbar which only shows the record manipulation buttons for edit, post (submit), delete and refresh. The header band will show a title label.

Figure 7: The parameter dialog


Parameters

Parameter Name	Data Type	Default Value	Input/Output	Description
ViewMode	String	vmSingle	In	Form data display mode
PageSize	Integer	10	In	Number of records per request
StartingOffset	Integer	0	In/Out	Starting index of first record in current page
SQLFilter	String		In	Dynamic filter applied to underlying dataset
RecordCount	Integer		Out	Total number of records in data source
UIDField	String	MFK$GUID	Out	Field used to uniquely identify records
AlbumID	Integer	0	In	ID of album to edit

With this, the form is almost ready to go: the only thing that still needs to be done is to make sure the form will show the correct record when it is called. To do this, 2 properties of a form are used:

- The form can have a number of parameters associated with it. The parameters of a form must be defined at design time. This can be done using the parameter definition dialog; The dialog can be accessed from the context menu in the form designer. When opened, it will look something like figure 7 on page 10. For the `AlbumEditForm` form, a parameter `AlbumID` of type integer will be defined. By default it'll have a value 0. All parameters will be available in the code of the form as if the parameter was a string property of the form.
- In the parameters dialog a `SQLFilter` parameter is also visible: this is actually a property of the form. This gives us a hint of how to make sure the correct record will be shown when the `AlbumEditForm` form is shown: the SQLFilter property is used as a filter on the datasource to which the form is bound.

These 2 points give us the mechanism to show the correct record when the edit form is shown. In the `OnReady` event in the browser, the following code is executed:

```
Procedure AlbumEditForm.WebFormReady(Var Ready: Boolean);
Begin
  If (AlbumID<>'-1') then
    begin
    ChangeFilter('B_ID='+AlbumID);
    ShowTracks(StrToInt(AlbumID));
    LTitle.Caption:='Editing album '+AlbumID;
    end
  else
    begin
    NewRecord(Nil);
    TCAlbum.Enabled:=False;
    LTitle.Caption:='Adding new album';
    end;
End;
```

The code is quite simple: if the `AlbumID` parameter is different from -1, the SQLFilter property is changed to `B_ID=ALBUMID`: this will make sure the form only shows the record for the album with ID `AlbumID`. After this, the tracks for the form are shown (later more about this), and the title caption is set.

If the `AlbumID` parameter is -1, this signals to the form that it should create a new record. This is done with the `NewRecord` procedure. The procedure accepts a parameter of type `TDomEvent`. Since no such event is present, `Nil` is passed. After this, the tabcontrol with the tracks and pictures is disabled and the title caption is set to something informative.

There are 2 good reasons for disabling the tabcontrol:

1. As long as the album is not in the database, the tracks cannot be entered, since they must refer to an album record with their `T_ALBUM_FK` field.
2. The fileuploader controls do not work if no record is present: they need an existing record in the database in order to work.

The tabcontrol is enabled again after the record was posted to the database. There are various events which are executed during the database update routines: `OnBeforeSubmit`, `OnAfterSubmit` (executed before and after the form submits the data to the server) and `OnBeforeDataChange`, `OnAfterDataChange` (executed before the submitted data is actually changed in the browser), and finally `OnBeforeRefresh`, `OnAfterRefresh`: when the form data is refreshed with the values from the database. The new values from the database are only known after the refresh, so this is when the tabcontrol can be enabled again:

```
Procedure AlbumEditForm.WebFormAfterRefresh(Failed: Boolean);
Begin
  If Not TCAlbum.Enabled then
    begin
    TCAlbum.Enabled:=True;
    ShowTracks(StrToInt(LID.Caption));
    LTitle.Caption:='Editing album '+LID.Caption;
    end;
End;
```

Note that the `AlbumID` parameter is not usable in this routine (it'll be set to -1), and therefore an invisible textlabel (`LID`) is dropped on the form, bound to the `B_ID` field. Morfik offers currently no way to access the data of the datasource directly in the browser code, so the use of an invisible label bound to a field is the only way of accessing data without actually showing the data to the user: in the above case, the new value of the `B_ID` field will be shown in the `LID` as soon as the data is refreshed from the server. The value is also used to update the title caption.

With the exception of the editing of album tracks, the form can now be used, and should look something like figure figure 8 on page 12.

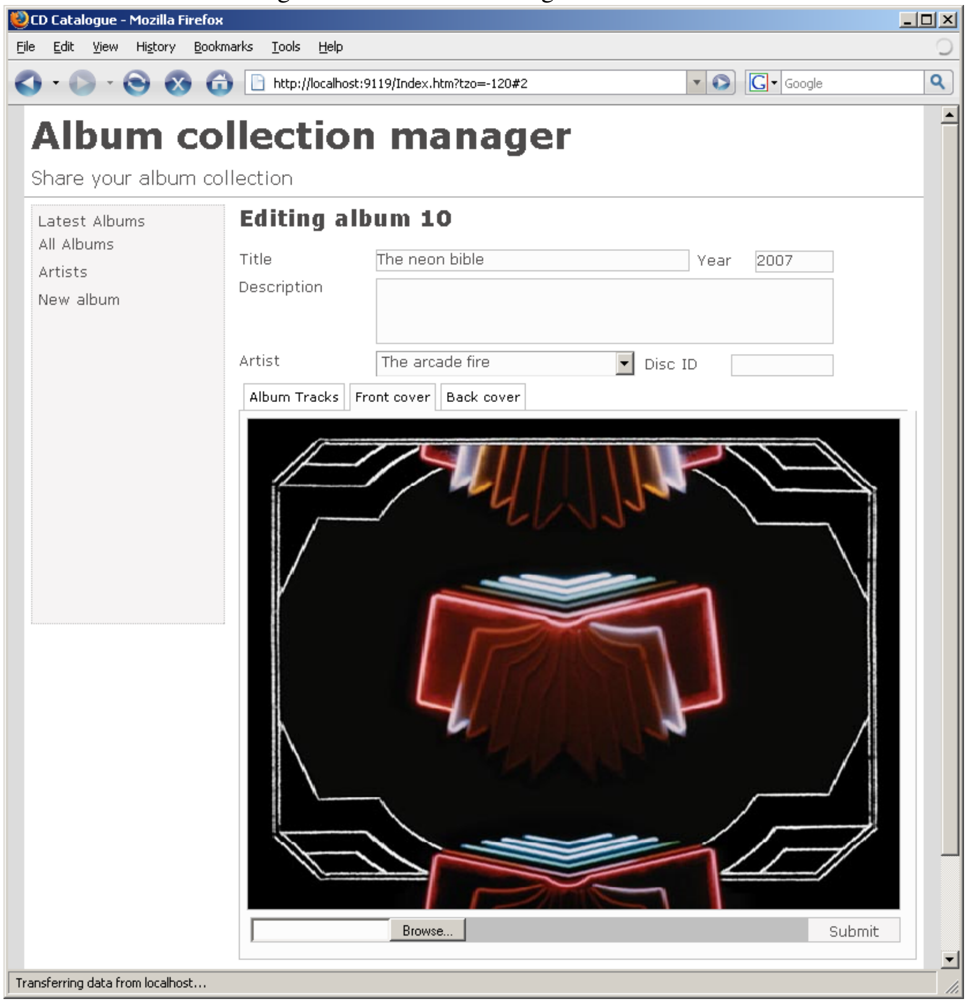
To call it, 2 labels are added to the rest of the application: The first label is a 'New album' label in the sidebar menu , which will have the following code in it's 'OnClick' event handler:

```
Procedure SideBar.LNewAlbumClick(Event: TDOMEvent);
Begin
  OpenForm('AlbumEditForm', 'Index:MainArea','"AlbumID=-1"');
End;
```

As can be seen, the sentinel value of -1 is passed to ensure the form is put in insert mode.

To edit an album, a label displaying the ID of an album was placed on the `AllAlbumsForm`. In the 'OnClick' event of this label, the following code is placed:

Figure 8: The album editing form in action


CD Catalogue - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost:9119/Index.htm?tzo=-120#2
Google
Latest Albums
All Albums
Artists
New album
Album Tracks
Front cover
Back cover
Browse...
Submit
Transferring data from localhost...

Album collection manager

Share your album collection

Editing album 10

Title: The neon bible Year: 2007

Description:

Artist: The arcade fire Disc ID:

```
Procedure AllAlbumsForm.Cell_B_IDClick(Event: TDOMEvent);

Var
  P : String;

Begin
  Cell_B_ID.BandIndex:=GetEventSource(Event).BandIndex;
  P:='"AlbumID='+Cell_B_ID.Caption+'"';
  XApp.OpenForm('AlbumEditForm','Index:MainArea',P);
End;
```

The first line makes sure that the correct `Cell_B_ID` label ID is used: since the form is displayed multiple times (once per record), the `Cell_B_ID` identifier needs to point to the correct instance. This is done by setting its `BandIndex` property, which can be retrieved from the `Event` that caused the `OnClick` event to fire. The `BandIndex` tells the definition of the label which instance of the form should be used.

6 Using queries

Till now, only tables were used, with a filter on the table to limit the number of records. Obviously, it is also possible to use queries. Now that the album information can be edited, the last thing that still needs to be editable are the tracks in an album. This offers the chance to show that queries can be used just as well as tables.

From the explanation above, it should be clear how this will be handled: A form must be created which allows to show and edit the tracks, and this form will be shown in the subform container `SFTracks` in the `AlbumEditForm`. The design of the `TracksForm` is similar to the design of the `AllAlbumsForm`:

- It's `DataSource` is the `AlbumTracks` query.
- It's `ViewMode` will be `vmContinuous`.
- It'll be read-only, editing will be done through a secundary form `EditTrackForm`, which will be shown modally as soon as the track is double-clicked.
- A separate label will be shown to create a new track.
- It gets passed a parameter `AlbumID`, which will be used in the query/

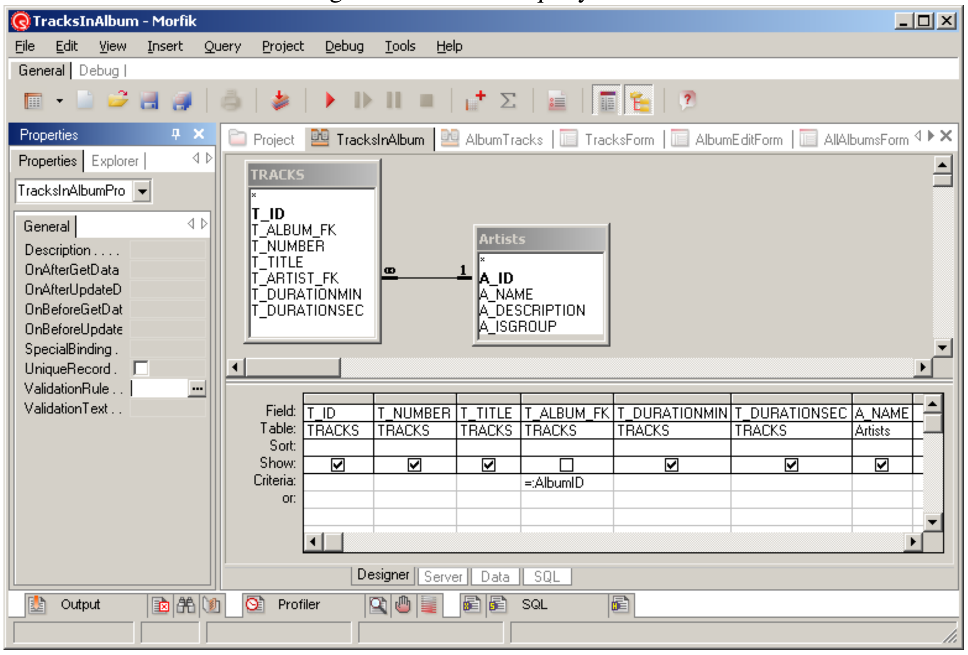
Once this form is ready, it is called in the `AlbumEditForm` with the following method:

```
Procedure AlbumEditForm.ShowTracks(AnAlbumID : Integer);

begin
  OpenForm('TracksForm','self:SFTracks',
           '"AlbumID='+IntToStr(AnAlbumID)+'"');
end;
```

To design the AlbumTracks query, the query designer must be used. The query designer can be used in 2 modes:

1. Visually. A visual query editor, as shown in figure 9 on page 14

Figure 9: The visual query editor



Field:	T_ID	T_NUMBER	T_TITLE	T_ALBUM_FK	T_DURATIONMIN	T_DURATIONSEC	A_NAME
Table:	TRACKS	TRACKS	TRACKS	TRACKS	TRACKS	TRACKS	Artists
Sort:							
Show:	✓	✓	✓	☐	✓	✓	✓
Criteria:				=:AlbumID			
or:							

2. The SQL can be typed in directly. Optionally, the Morfik IDE will check the query for it's syntax, but sometimes it is necessary to disable this behaviour: the Morfik IDE does not understand all possible forms of valid Firebird SQL syntax.

Obviously, the result of the query (if it is a SELECT query) can be viewed in a data grid.

Whatever method is used to create the query, the following is the query that is needed for the `TracksForm`:

```
SELECT
  T_ID,
  T_NUMBER,
  T_TITLE,
  T_DURATIONMIN,
  T_DURATIONSEC,
  A_NAME
FROM
  TRACKS LEFT JOIN "Artists" ON (T_ARTIST_FK=A_ID)
WHERE
  (T_ALBUM_FK=:AlbumID)
ORDER BY
  T_NUMBER
```

Note the `AlbumID` parameter: this parameter must be defined as a query parameter in the parameter dialog, just as this is done for a form. If a form uses a query with parameters as a datasource, it will automatically define any of the query parameters as a form parameter, and in runtime, will apply the form parameters to the query.

The `TracksForm` form is now ready to be used: it can show the tracks of an album.

To edit a track, or to add a new track to an album, a small track editing dialog is created. Since queries are not updatable, this form must again be based on a table as a datasource. It will work similar to the `AlbumEditForm`:

- Its datasource is the `Artists` table.
- its viewmode is `vmSingle`
- It has a navigation bar with a submit and refresh button. No navigation buttons.
- On startup, it should check whether it should insert a new record, or edit an existing record.

But there is some additional functionality needed:

- The form must be shown modally, as a popup window.
- When a new record is inserted, the Artist ID (in the `T_ARTIST_FK` field) should be pre-filled with the value that was specified for the album (`B_ARTIST_FK`). This value must be passed on by the `TracksForm` form in a form parameter (we'll name it `ArtistID`).
- Similarly, when a new record is inserted, it should fill in the track number with the next track number. Again, the `TracksForm` should specify this value in a form parameter called `TrackNo`.
- Obviously, when submitting a new record, it should refer to the correct album. For this, the album ID must be passed on to the form in a `AlbumID` parameter. The album ID field (`T_ALBUM_FK`) must therefor be made accessible through an invisible textedit control.
- After submitting it's data, it should refresh the list of tracks to reflect the changes in the list of tracks.

The visual design of this form is not so complicated. More interesting is the `OnReady` event handler, where most of the extra work is performed:

```
Procedure EditTrackForm.WebFormReady(Var Ready: Boolean);
Begin
  If (TrackID<>'-1') then
    ChangeFilter('(T_ID='+TrackID+')')
  else
    begin
    NewRecord(Nil);
    If (TrackNo<>'-1') then
      Control_T_NUMBER.Text:=TrackNo;
    If (ArtistID<>'-1') then
      Control_T_ARTIST_FK.Value:=ArtistID;
    EAlbumID.Text:=AlbumID;
    end;
End;
```

For editing an existing record, the code is very simple: the filter is set to the correct value. The code to add a new record is a slightly longer: first the form is put in insert mode. Then the track number is set from the parameter that was passed to the form, and similarly for the Artist ID. Note that the `Value` property is used for the ComboBox control. Setting the `Value` property will cause the control to look up the correct text in it's lookup data source, and display the text associated with the value (in this case the artists' name). Finally, the album ID is set to the value passed in the `AlbumID` parameter.

The form is now ready to be used: it is fully functional. The final thing that must be done for a maximum user experience is to refresh the list of tracks as soon as the data of the form is submitted, and to close the form. This is done in the `OnAfterSubmit` event:

```
Procedure EditTrackForm.WebFormAfterSubmit(Failed: Boolean);

Var
  P : String;

Begin
  P:='"openmode=refresh"';
  P:=P+', "AlbumID='+AlbumID+'"';
  OpenForm('TracksForm','AlbumEditForm:SFTracks',P);
  Close;
End;
```

The refreshing is done by redisplaying the tracks form, with the `openmode` parameter set to `refresh`, and additionally passing the `AlbumID` parameter: this is necessary, because the form is actually refetched from the server, thereby discarding it's previous state and parameter values.

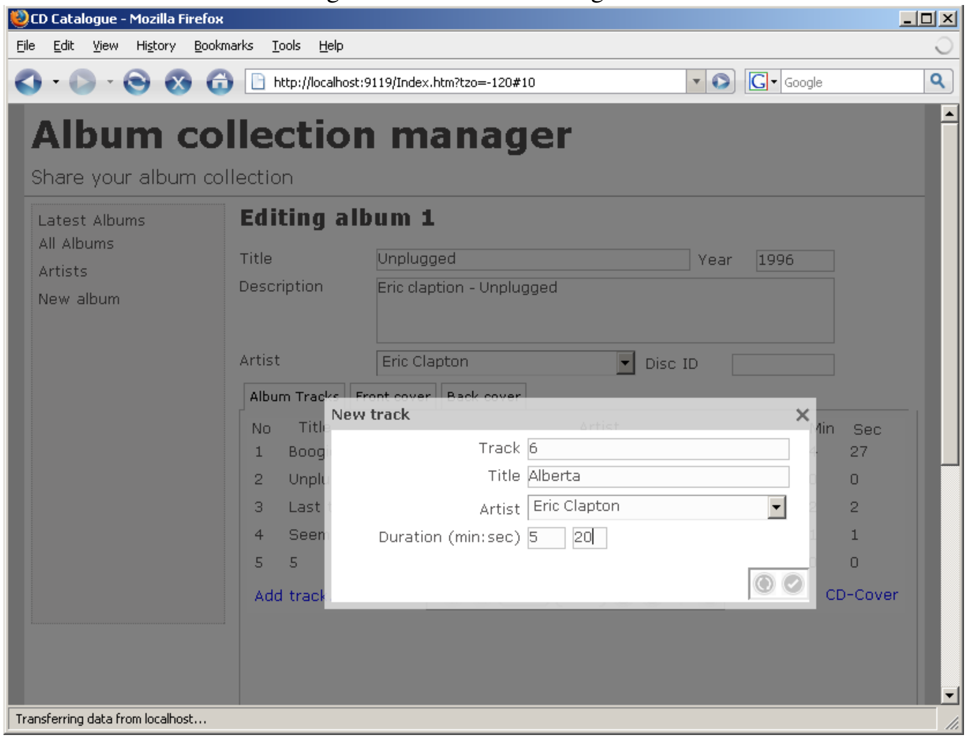
Now that the form is ready for use, the code must be written to call the form. This is done in the `TracksForm` `EditTrack` method:

```
procedure TracksForm.EditTrack(TrackID : Integer);

Var
  P : String;
  T : String;

begin
  If (TrackID=-1) then
    T:='New track'
  else
    T:='Edit track '+IntToStr(TrackID);
  P:='"title='+T+'", "modal=true", "closeable=true"';
  P:=P+', "TrackID='+IntToStr(TrackID)+'"';
  P:=P+', "AlbumID='+AlbumID+'"';
  If (TrackID=-1) then
    begin
    P:=P+', "TrackNo='+IntToStr(RecordCount+1)+'"';
    T:=ComboBox(OwnerForm.GetControlByName('CBArtist')).Value;
    P:=P+', "ArtistID='+T+'"';
    end;
  XApp.OpenForm('EditTrackForm','POPUP',P);
end;
```

As can be seen, quite some work is done to prepare the form parameters: First of all, since the form will be shown modally (as a popup dialog) an appropriate title is constructed, and the form is made modal and closeable by providing the appropriate parameters as discussed in the previous article.

After that, the `TrackID`, `AlbumID` and optionally the `TrackNo` and `ArtistID` parameters are constructed. Note that the value of the `ArtistID` is retrieved directly from the `AlbumEditForm`, which is accessible through the `OwnerForm` property: the `GetControlByName` function can be used to retrieve the Combobox instance bound to the `B_ARTIST_FK` field. Finally, the `EditTrackForm` is shown as a popup window. It can be seen in figure 10 on page 17.

Figure 10: The track editing form



http://localhost:9119/Index.htm?tzo=-120#10

Album collection manager

Share your album collection

Editing album 1

Title: Unplugged
Year: 1996
Description: Eric claption - Unplugged
Artist: Eric Clapton
Disc ID:

New track

Track: 6
Title: Alberta
Artist: Eric Clapton
Duration (min:sec): 5 20

Transferring data from localhost...

7 Reports

Morfik has a built-in reporting engine: the reports are created on the server and are sent to the client as a PDF file, so they can be stored on disk or printed, as the user sees fit.

The Morfik report designer is a banded report designer. It is similar in set-up as the MS-Access reporting engine, or as reporting tools such as Fastreports or Rave reports that come with Delphi. As such, designing a Morfik report is similar to designing a continuous form: the report band is shown for each record in the datasource the report was bound to. (obviously, a report without datasource can also be made). For this reason, the design of reports will not be extensively covered: it is completely similar to designing forms.

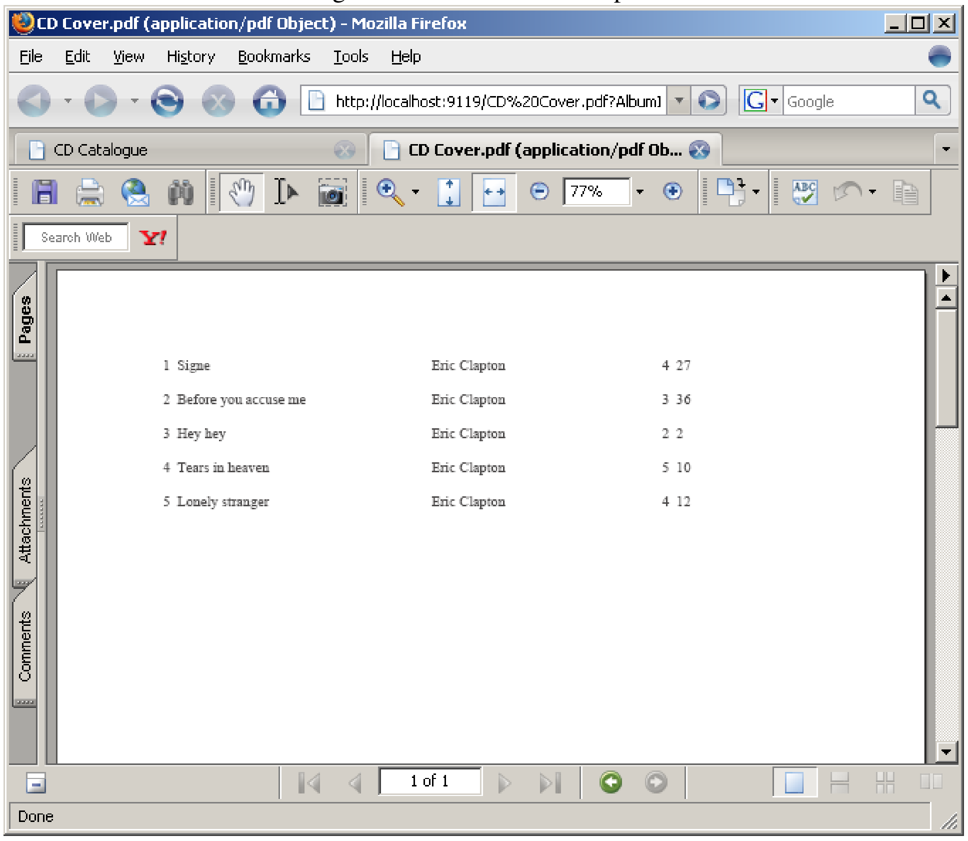
To demonstrate this, a small simple report will be made that makes a track list, suitable for a CD-Cover. The report (named `CD Cover`) will be made based on the `AmbumTracks` query, which is used for the displaying of tracks in the album editing form. The form has a single band which displays the track number, title, artist and duration: each in a textlabel of their own. This is an extremely simple report, with no code attached to it.

To show it, a small label is placed on the footer band of the `TracksForm` form. In it's onclick event, the following code will be executed:

```
Procedure TracksForm.LCDCoverClick(Event: TDOMEvent);
Begin
  OpenReport('CD Cover','"AlbumID='+AlbumID+'"');
End;
```

As can be seen, the code is very similar to a `OpenForm` call. In difference with OpenForm, no target can be specified: a report is always opened in a new browser window, and cannot be embedded in a form. The only parameter that needs to be passed is the ID of the album for which a tracklist must be printed. The result can be seen in figure 11 on page 18

Figure 11: The CD-Cover report



CD Cover.pdf (application/pdf Object) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost:9119/CD%20Cover.pdf?Album]
Google
CD Catalogue
CD Cover.pdf (application/pdf Ob...
77%
Search Web
Pages
Attachments
Comments
1 of 1
Done

```
1  Signe                  Eric Clapton        4  27
2  Before you accuse me   Eric Clapton        3  36
3  Hey hey                Eric Clapton        2  2
4  Tears in heaven        Eric Clapton        5  10
5  Lonely stranger        Eric Clapton        4  12
```

A more extensive report with grouping, a page footer and header can be found in the 'AllAlbums' report: it makes a report with all albums and their tracks, using `AlbumContents`. It also shows how to change the text of the controls in an event by displaying the page number in a label on the page footer. The `Report all albums` label in the sidebar can be used to show the report.

8 Conclusion

In this article, it has been shown that accessing a database in Morfik can be done with great ease: the only code needed to do this is form navigation code: almost no other code needs to be written. The code is mainly concerned with passing parameters. Actual database access code need not be written: all this is handled transparantly by the Morfik framework. What is true for user interaction forms is also true for reporting: the reports need no code, but can be customized through code. It is also possible to access the database more directly instead of through the pre-defined queries, but this will be shown in a next contribution, where web-methods will be discussed.