Kofax eFlow
Design Free User's Guide

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KOFAX

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Preface

Design Free is a powerful tool, which simplifies the process of breaking data out of "free forms". A "free form" is a semi-structured document such as an invoice or a purchase order. A semi-structured form has no fixed text and the position of the fields varies from document to document. This guide explains how to use the Design Free tool.

Product documentation

To access the full Kofax eFlow documentation set online, see the Kofax eFlow Product Documentation page. For a complete set of Kofax eFlow documents, refer to the Kofax eFlow Release Notes.

About Design Free

Freedom's unique recognition engine makes it possible to extract data from "free forms", without having to provide a detailed definition of the Empty Form Image (EFI). It does this using specified fields and keywords that are common to a type of form, such as an invoice, and then, using defined rules, matches the two to achieve a positive recognition.

Freedom comprises Freedom Script (FFS) files, FFI files, validation functions, and the Validate station components.

Freedom script (FFS) files

FFS files contain definitions for the Freedom algorithm. At least one FFS file per flow should exist in the setup folder (`...\Program Data\TIS\eFLOW 6\AppData\Server \[ApplicationName]\Setup`).

The FFS file contains the definitions of the Freedom recognition process. The file is in the setup folder of the application.

The FFS file contains the following information:
- The fields on the document
- Keywords for the fields
- The names of rules and validation functions
- Rules

FFI files

FFI files are mandatory. They contain the list of possible document creators (that is, Freedom form types) and the list of FFS files.

The FFI file contains information about the flow, and has .ffi extension (<FlowName>.ffi). The location of the file is the setup folder of the application (`...\Program Data\TIS\eFLOW 6\AppData\Server\[ApplicationName]\Setup`).

The FFI file contains the following information:

- All flow setting dialogs (see Flow settings).
- A list of all Freedom scripts that belong to this flow
- The OCR engines that should be used

Validation functions

Validation functions are used when you have specific knowledge about the content of a field, but FFS rules cannot be used to support this knowledge. For example, the VAT registration number in specific invoices contains nine digits, generally in a specific structure such as 123 4567 89.

Validation functions are optional and can be customized for a specific application.

Validation functions should be defined in the FFS file. The DLL that contains these functions are available in the following location:

```
…\Program files\TIS\Freedom\Bin
```

These functions can access any data that was returned by the OCR using an API.

To use a validation function in Design Free, click **Properties editor** > **Validation (DLL)** and then in quotes, type the validation DLL name, a period, and then the function name.

Example: "Name.FunctionName"

There are two header files for Delphi & VC++.
- ffValidDll.h (VC++)
- ffValidDll.pas (Delphi)

Validate station

For information on the Validate station, refer to the *Kofax eFlow Validate User Guide*.

How Freedom recognizes data

The following example illustrates the process that Freedom uses to recognize data from a Free form.

1. The system searches for the defined field, such as the date 19/09/17. The level of recognition success, or confidence level, is calculated according to the field mask, field type, user DLL, and OCR quality.

2. The system then searches for the defined keyword, such as Date. The confidence level is calculated according to a positive match with the keyword and OCR quality.

3. Freedom tries to match the field and the keyword by applying topographical rules, such as distance, location, and clean areas.

4. User-defined rules are then applied to determine at the final matching.
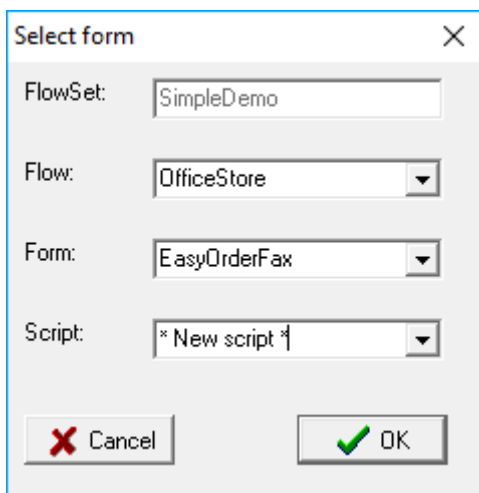
The recognition process is illustrated in the following diagram.
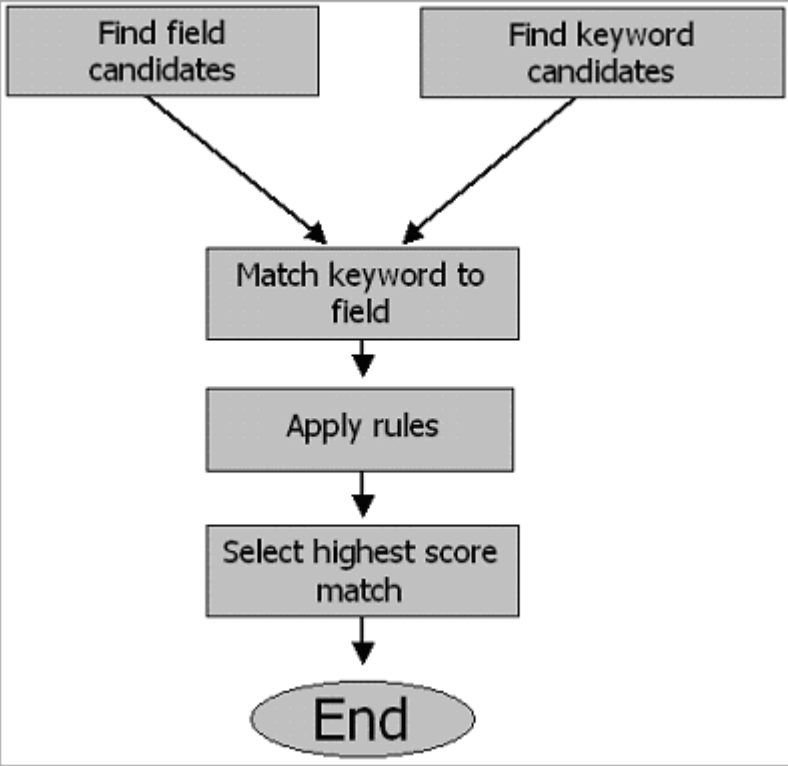
Get started

To open the Design Free module, in the **eFlow LaunchPro**, from the **Tools** list, select **Design Free**. The **Select form** form appears.

Select a flow

The **FlowSet** box displays the name of the application selected in eFlow LaunchPro. This name cannot be changed.

1. In the **Flow** list, select the required flow.
2. In the **Form** list, select the required form name.
3. In the **Script** list, select a script to edit, or select **New Script** to create a new one.
4. Click **OK**.
   The **Design Free** window appears.
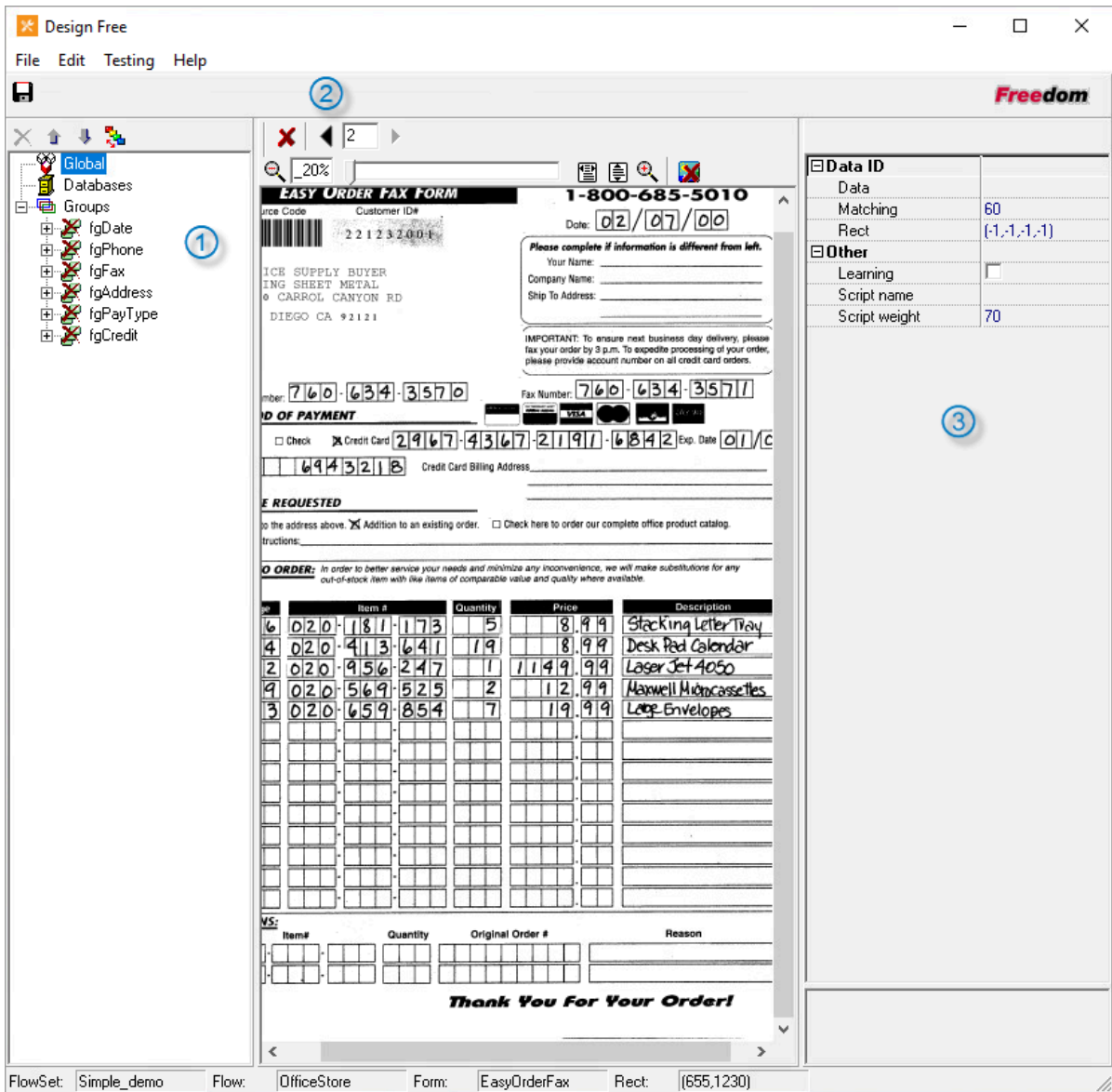
1	Explorer
2	Toolbar
3	Properties editor

5. Optional. If required you can create a new script:

  a. In the **Explorer**, click **Global**.

  b. In the **Properties editor**, click **Script name**.

  c. Type a short name for the script.

6. On the **Toolbar**, click **Save** 💾.

Add an image

You can view the form for which you are designing a script in the Page viewer. You can set field properties, such as the exact location of the field.

1. Click **File** > **Add image**.
2. In the **Open** dialog box, select the image file and click **Open**.
   The image is displayed in the Page Viewer.
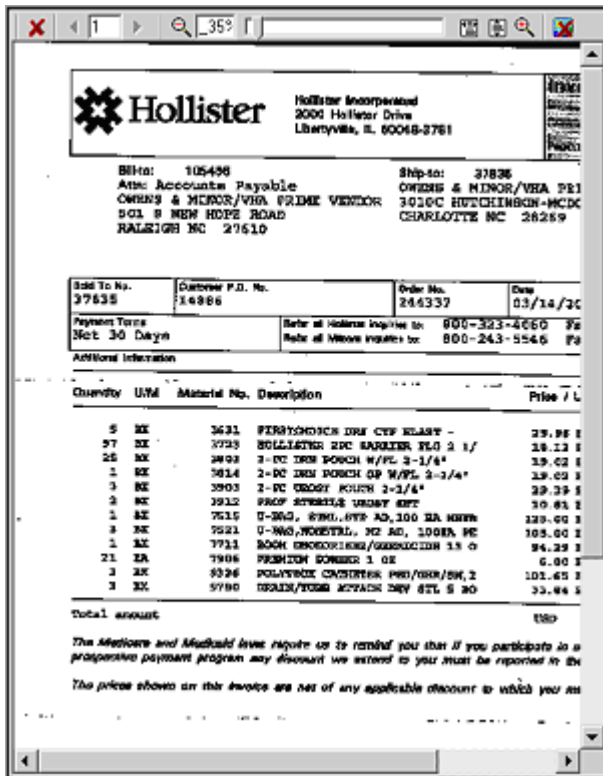
The Design Free window

This topic details different sections of the **Design Free** window. You can define database, groups, fields, and confidence level of your application in this window.
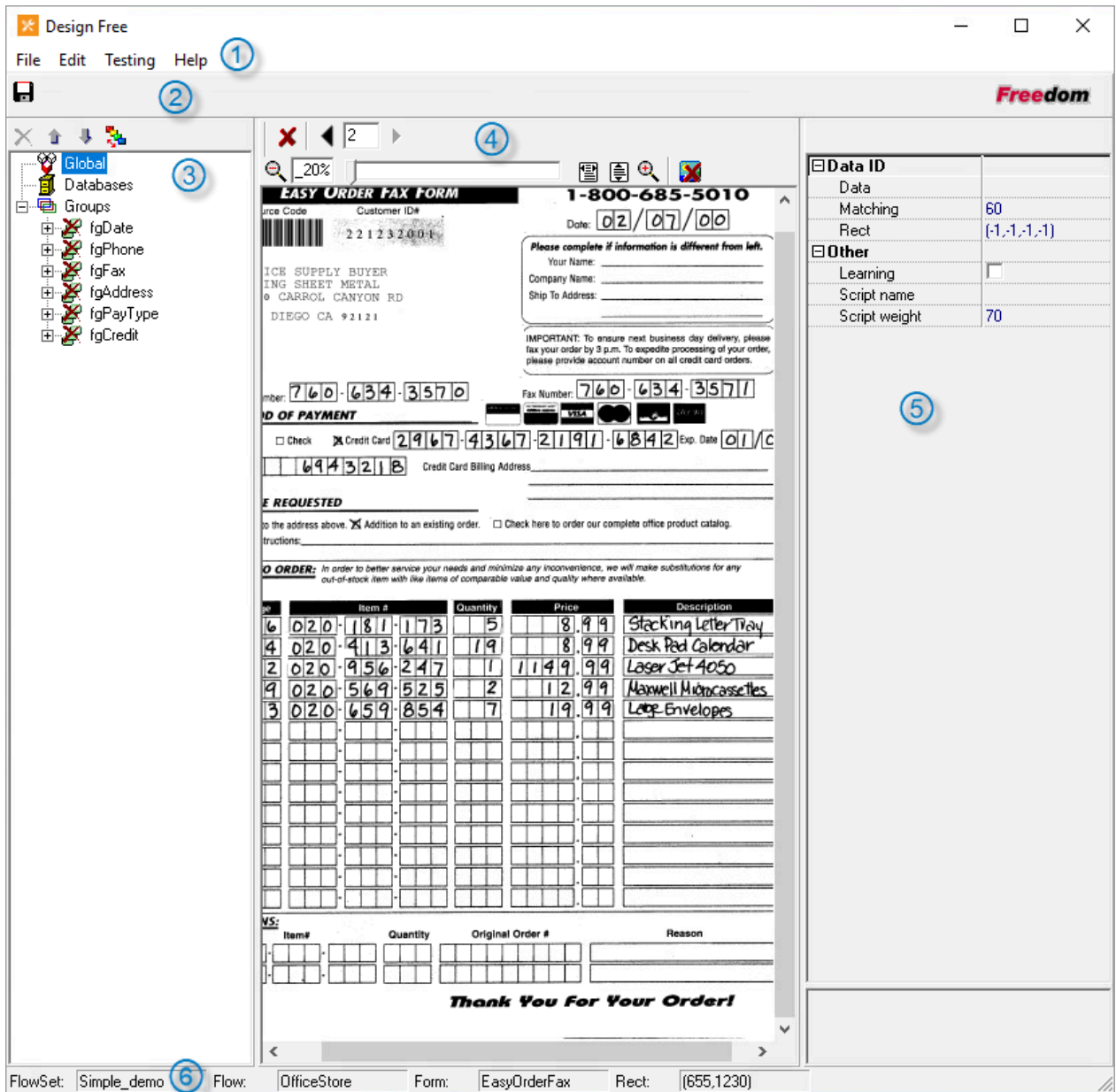
1	Menu bar
2	Toolbar
3	Explorer
4	Page viewer
5	Properties editor
6	Status bar

Explorer

The Explorer lists the setup categories and the subcategories within them. To expand or collapse the lists, click ⊞ or ⊟.
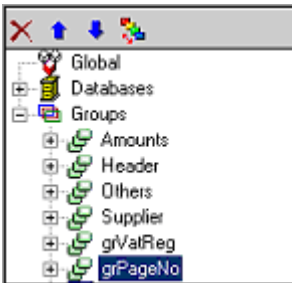
The following buttons are activated if a category is selected that has subcategories.

Button	Description
✖	Deletes the selected category or subcategory.
⬇	Moves the selected field one level down in the list order. The system first performs at groups and tables and then at the field order.
⬆	Moves the selected field one level up in the list order.
⚙	Collapses all unselected groups and expands the selected group.

Toolbar

The following toolbar button is available.

Button	Description
💾	Saves the current flow.

Menu bar

File

Option	Description
Open	Opens a form. See Select a flow for more information.
Add Image	Opens a .TIF image file. See Add an image for more information.
Save	Saves the current changes.
Remove	Removes a script.
Import	Imports a Freedom script file (FFS) from another location.
Exit	Exits Design Free. If you have not saved your work, then a Confirm dialog box is appears asking you whether you want to save the changes.

Edit

Option	Description
Application setting	Create a database and define a connection string. See Application settings for more information.
Flow setting	Rotation and image enhancement settings, script ordering, learning and template matching confidence, OCR engines, and ICR engines. See Flow setting for more information.

Testing

Option	Description
Check script	

Application settings

In the Application settings window you can create learning database, edit an existing database and create new KFL data.

It includes the following tabs:

- Learning
- Database
- KFL (Keyword Field Location) list

Learning
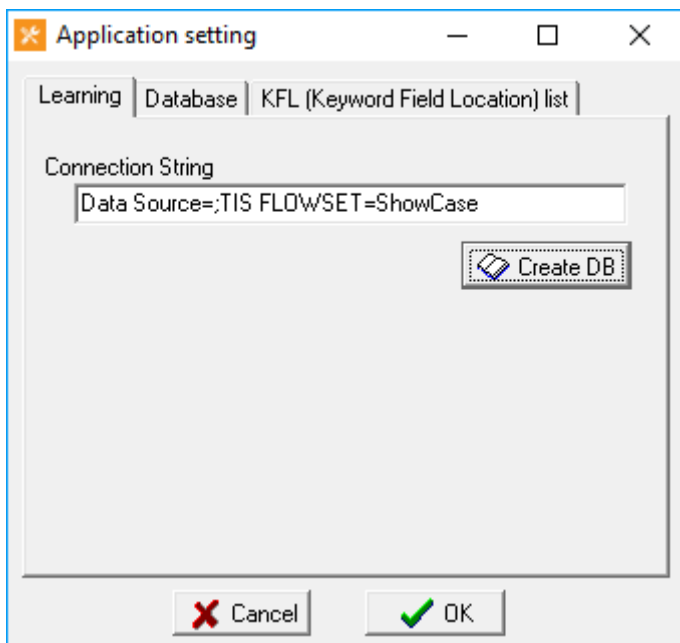
The **Connection String** box shows the learning database connection string. If there is no learning database, create a new one.

To create a new database click **Create DB**. The **User ID for creating database** dialog box appears.

Click to open the **Data Link Properties** dialog box and select the database type. For SQL Server databases, you must type the SQL server name, user ID, and password.

Database

The Database tab contains a hierarchical tree of the database tables and fields. The following properties can be set to the corresponding database.
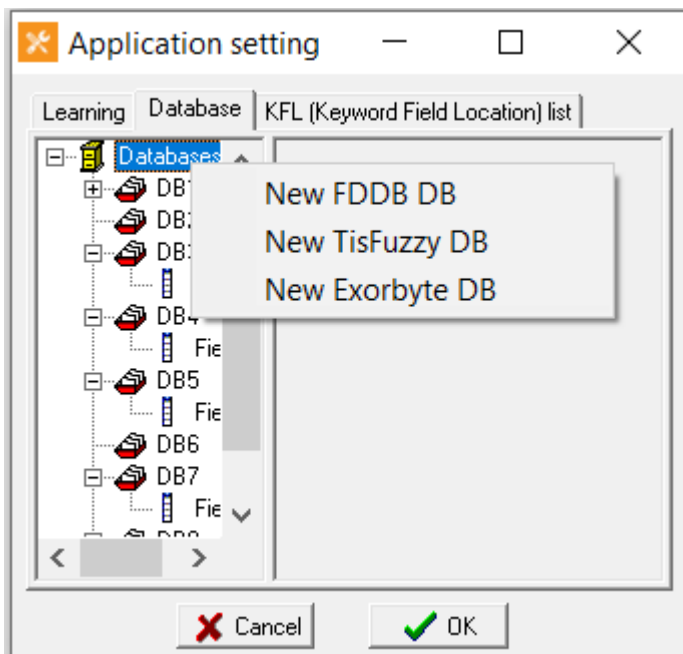
Database	Property	Description
FDDB	Column separator	The character that delimits the table columns, such as tab or comma.
	Unicode	A check box to specify whether the file encoding is Unicode.
FDDB and Fuzzy	File name	The name of the FDDB (delimited text) file. It is recommended to specify a path relative to the eFlow folder and not the full path.
Exorbyte	Server name	Name of Exorbyte server.
	Port No.	Port number used by Exorbyte to connect with the Server.

Field properties

Right-click the database and from the context menu select the required field.
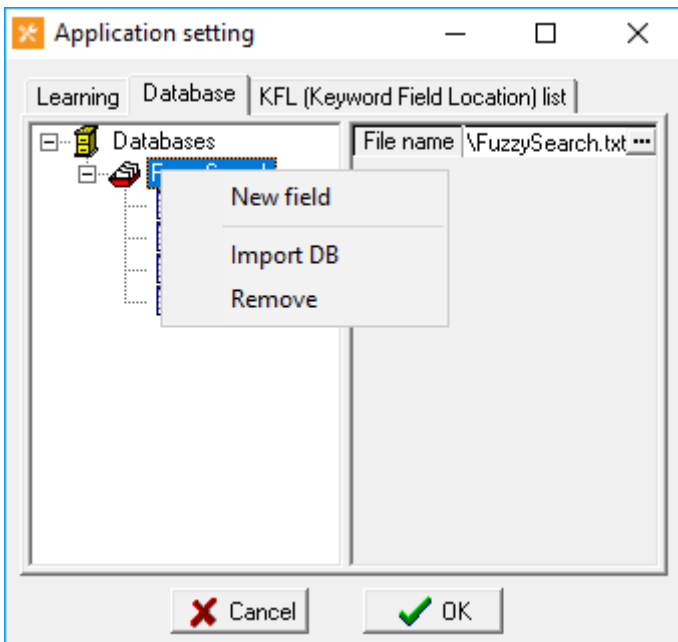
The following table details the context menu.

Menu item	Description
New Field	Used to add a field to the database. To change the field name, double-click the field and type a new name.
Import DB	Copies the input database into the eFlow CAB.
Remove	Removes the database from this eFlow application.

The field properties are dependent on the database type. For example, the **Words in Field** is not available for the FDDB database.
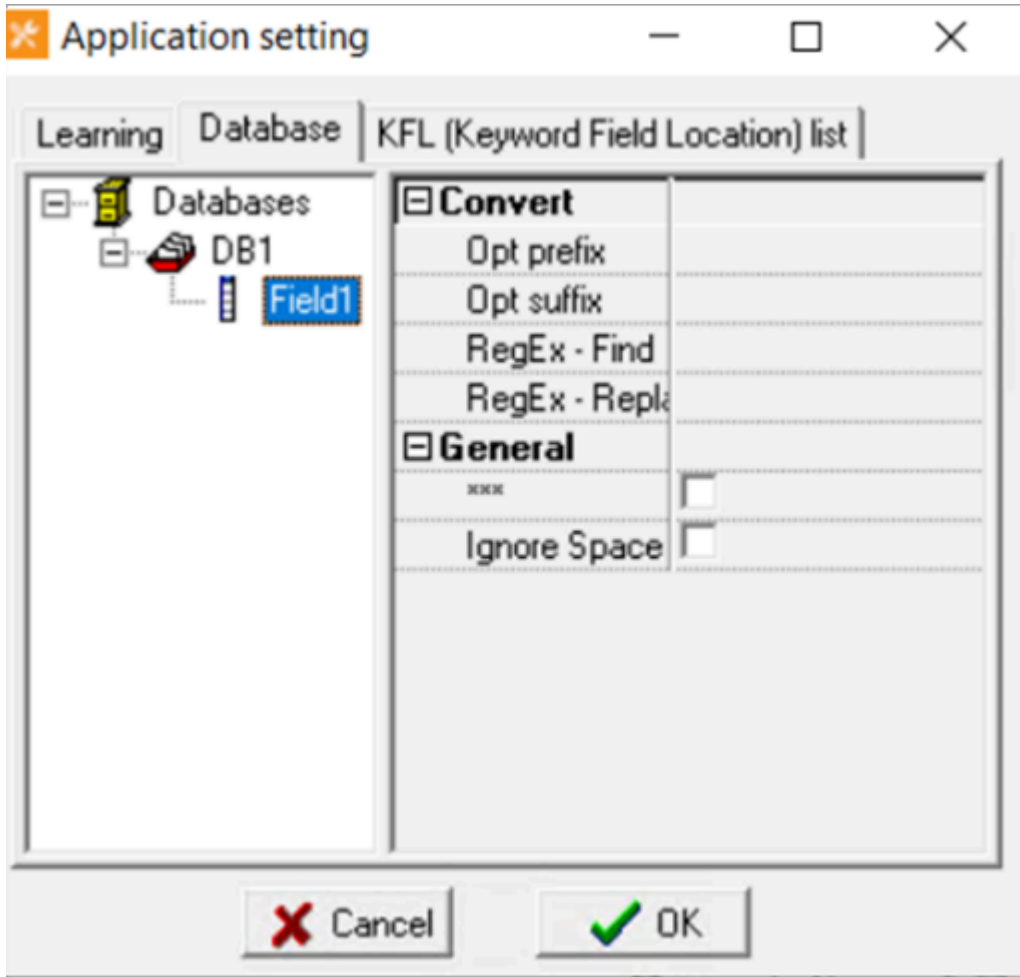
Database	Option	Description
FDDB	Ignore space	When spaces are ignored, the same text with spaces and without spaces are considered a match.
	Opt prefix/suffix	Optional. Text with or without this prefix/suffix is a match.
Exorbyte	Words in Field	Maximum number of words in the field.
All	RegEx Find / RegEx Replace	

KFL (Keyword Field Location) list

The purpose of KFL is to recognize handwritten fields that has machine printed keyword within a Freedom script.
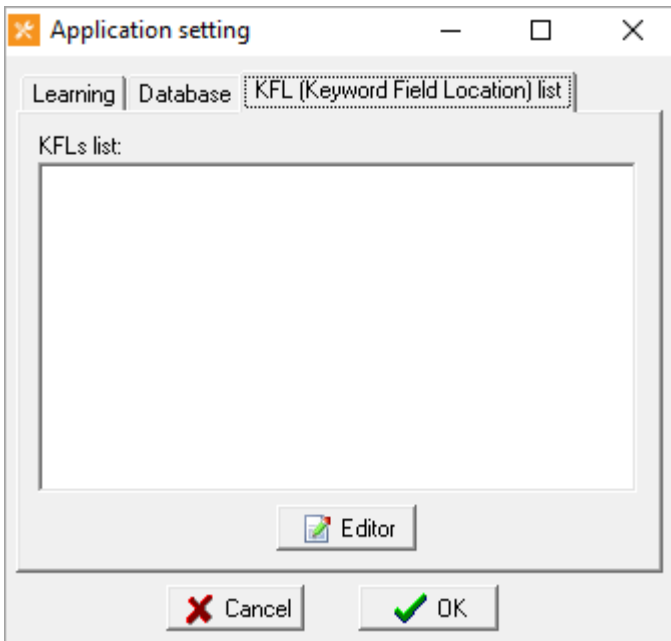
Click **Editor** to display the **KFL designer** where you can create new KFL data or edit the existing one.
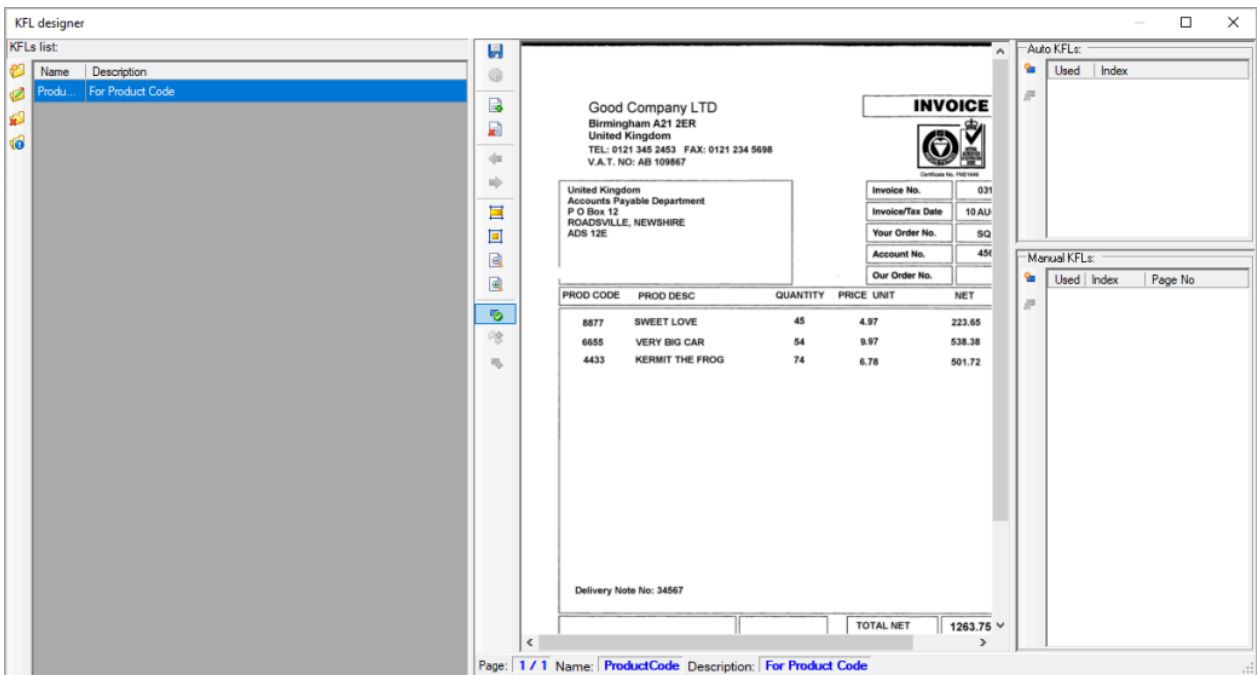
The following table explains the use of each icon in the KFL designer window.

Button	Description
New KFL data	Allows you create a new KFL data with name and description.
Edit KFL	Allows you to edit the existing KFL data.
Delete KFL	Allows you to delete the existing KFL data.
KFL data properties	Shows the properties of KFL data.
Save	Allows you to save KFL data.
Build Auto KFLs	Creates a new field automatically.
Add images file	Allows you to add a new image. ⓘ Add more images to get more accurate KFL data.
Remove current image page	Allows you to remove the current image.
Prev page	Displays the previous page.
Next Page	Displays the next page.
Fit Width	Fits the image to the width of the image viewer.
Fit all	Fits the image to the complete image viewer.

Button	Description
Zoom in	Zooms in the image.
Zoom out	Zooms out the image.
Accept keyword/ field change	Accepts the changes made to the field or keyword.
Edit Keyword	Allows you to edit a keyword.
Edit field	Allows you edit a field.
New field	Adds a new field.
Delete KFL	Allows you delete a KFL.

Flow settings

Flow settings allow you to add some advanced configuration for your script. To set the flow, click **Edit** > **Flow setting**. The Flow setting window appears.
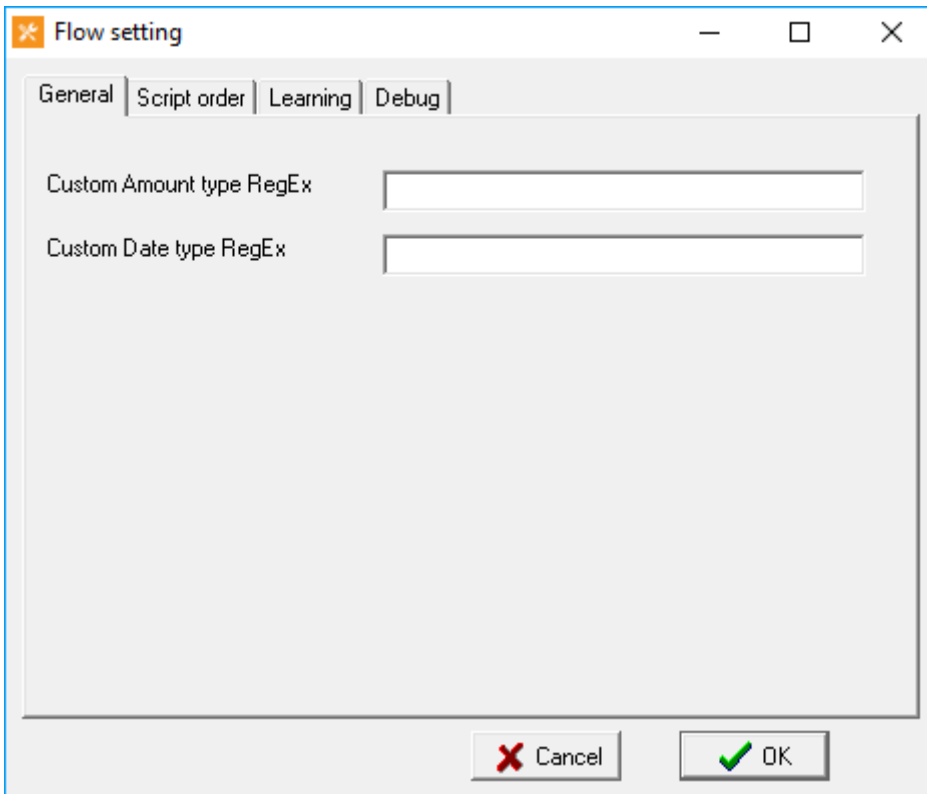
The Flow setting window includes the following tabs:

- General
- Script order
- Learning
- Debug

General

Sometimes date and amount differ from the standard built-in formats. You can influence the built-in algorithm by defining your own regular expressions (script level). This helps to achieve the following improvements in script:

- Faster run time
- Faster setup time (no need to change mask for each script)
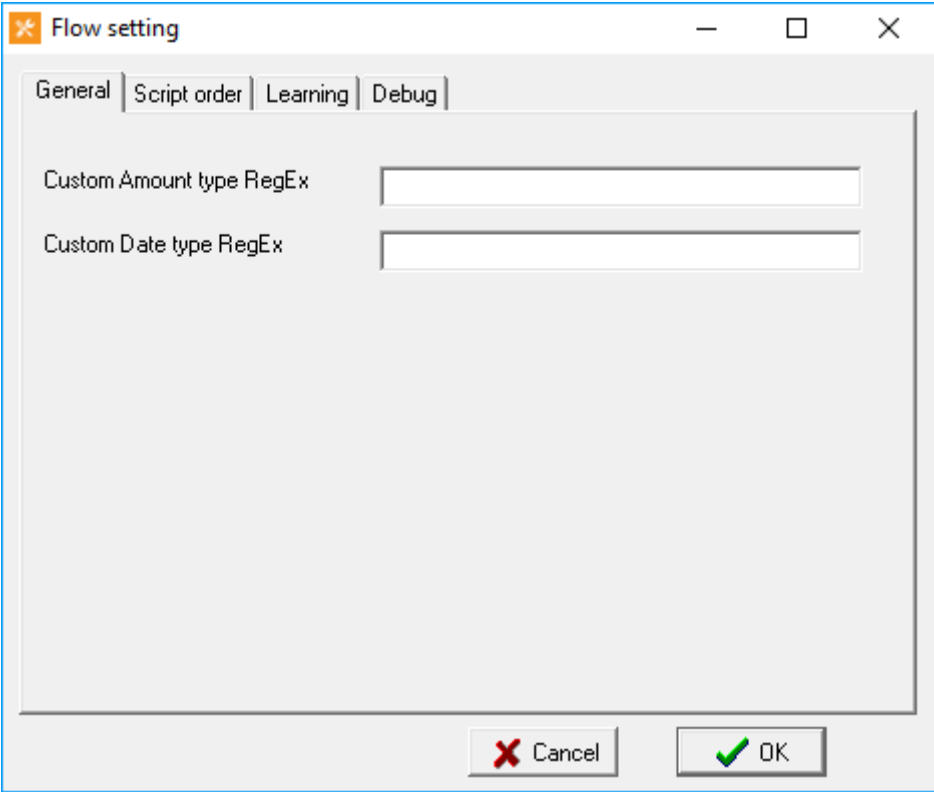
Option	Description
Custom Amount type RegEx	Regular expression for custom amount types.
Custom Date type RegEx	Regular expression for custom date types.

Script order

When there is more than one script, you can change the order and other settings.
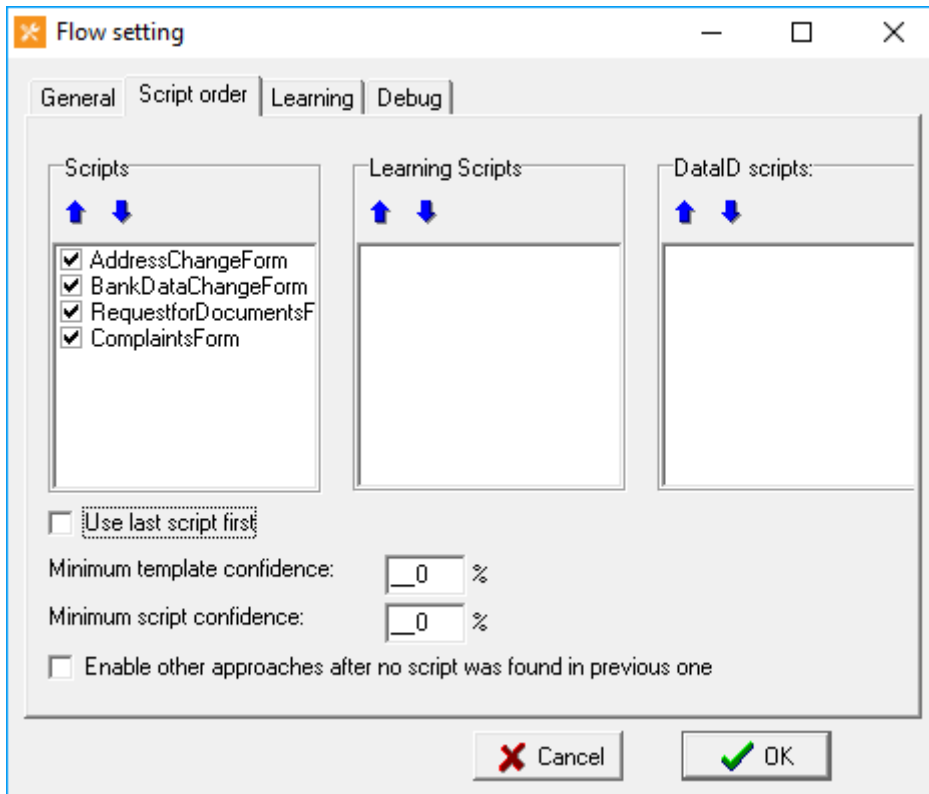
Option	Description
Scripts	Select the relative check boxes. Use the ⬆ and ⬇ to set the order in which the different scripts will be used.
	If you want to use the last script in the list first, select the **Use Last Script First** check box.
Learning Scripts	Similar to Script order, but works only on scripts that are marked as Learning. See the Other properties for more information.

Use the following properties to define the order of scripts.

Property	Description
Minimum template confidence	Sets the minimum value for which templates are considered matching. If confidence is above the value, the system runs a learning script. If confidence is below the value, system runs a rule-based script.
Minimum script confidence	Sets the minimum value for which scripts are considered successful. If confidence is below the value, the system proceeds to the next script.
Enable other approaches after no script was found in previous one	If the approach (dataID, template, rule-based script) fails, the algorithm sends the page to the next approach.

Learning

When there is a need to use learning, you can enable it, and set the template matching confidence percentage.
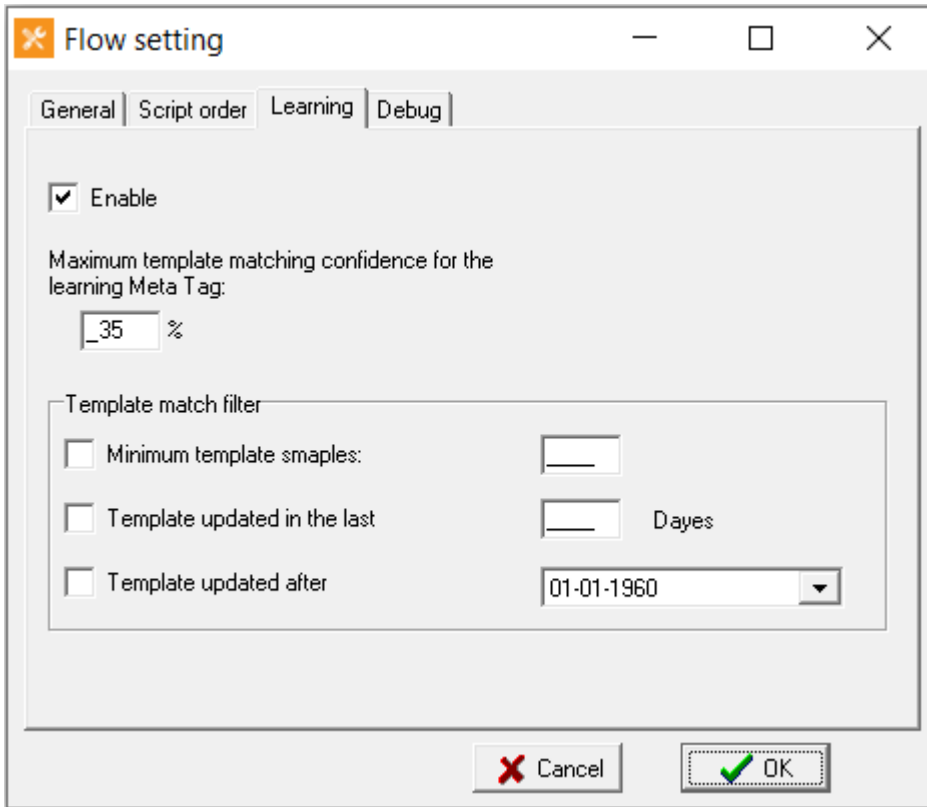
Option	Description
Enable	When selected, the learning script is enabled.
Maximum template matching confidence for learning station	Sets the matching confidence percentage that must be attained to continue to the next module. If the matching confidence percentage is lower than the set percentage, it will be returned to the Learning module until recognition is high enough.

Debug
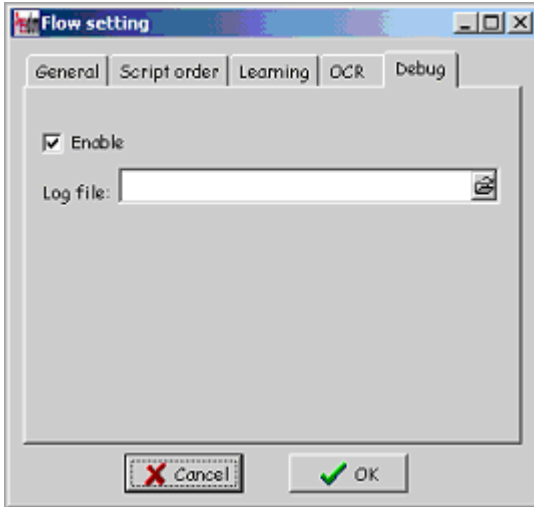
Option	Description
Enable	Enables the debug logger to receive messages.
Log file	Type or browse for a location in which the log file will be saved. If no path is provided and the Enable check box is selected, messages will go to the logger only.

Page viewer

In the Page viewer you can view and manipulate the selected image.
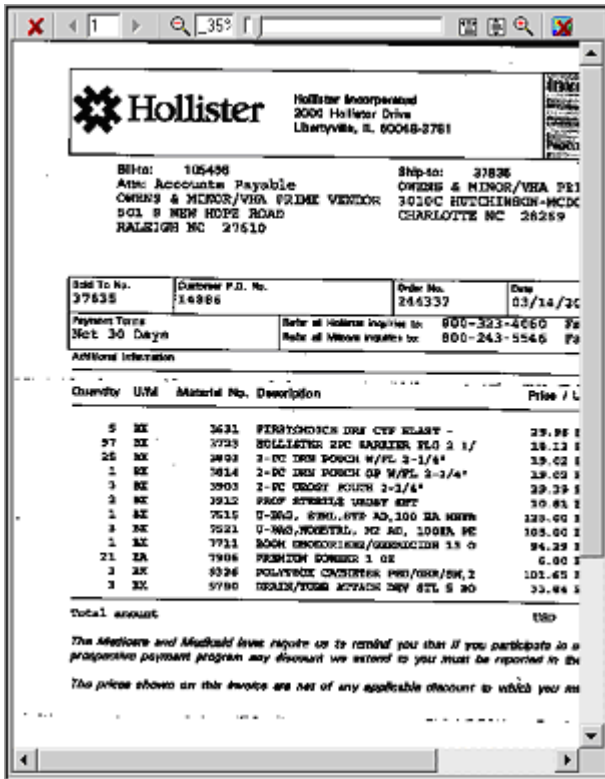
The following buttons are available on the page viewer.

Button	Description
✖	Removes the selected ROI.
◀	Shows the previous page.
2	Shows the number of the current page being displayed.
▶	Shows to the next page.
🔍	Zooms out the page.
303%	Shows the zoom percentage.
▭	The zoom toggle allows you to control the zoom percentage.
▤	Fits the page to the entire width of the page viewer.
▤	Fits the page to the entire length of the page viewer.
🔍	Zooms in the page.
✖	Removes the current page.

Properties editor

The Properties editor pane is located on the right of the screen. It includes all the properties corresponding to the selected category. To expand or collapse the list of sub properties under each property heading, click ⊞ or ⊟.

Field info	
Type	TextOneWord
Style	Machine writing
Mask	...
Bad mask	
Validation (DLL)	
Required	☑
Database	
Database Name	-None-
Field name	
Weight PC	80
Weight NC	80
Complete	100
Keyword	
Keywords	...
⊞ Location	Left,Top
Bad keywords	
Weight PC	80
Weight NC	40
Confidence	
Min PC	45
Max NC	60
Location	
Rect	[-1,-1,-1,-1]
Dynamic	
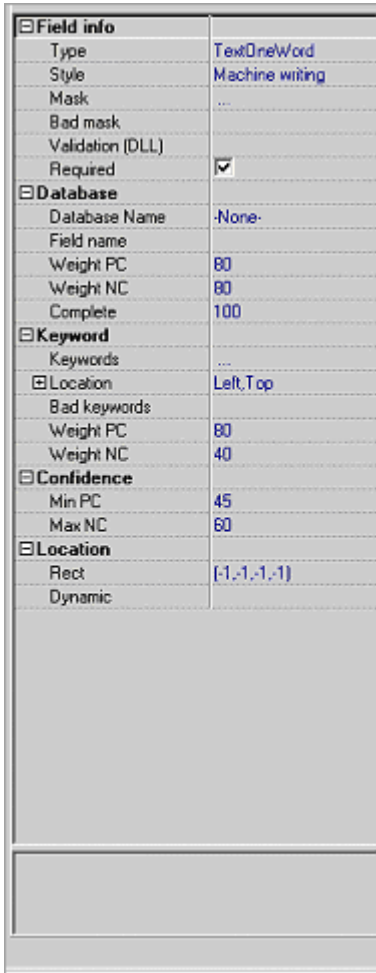
When a sub property is selected, a short description of the sub property is displayed at the bottom of the Property editor pane.

Status bar

The status bar displays the FlowSet (selected application), Flow, and Form names at the bottom of the Design free window.

FlowSet	FreedomSampl	Flow:	Invoices	Form:	Invoices	
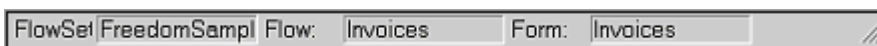
Chapter 3

Define global settings

To display the global properties, click **Global** in the Explorer pane. The list of properties is displayed in the Properties editor pane.

Data ID properties

Data ID allows you to set rules to identify forms which are slightly different from the regular forms. As the identifying text and its location on the page are specified, no further rules are needed. The Script order is also negated as only this one script will be used on this form.

Property	Description
Data	Enter the actual text to identify. 1. Click ⟨...⟩. The **Editing Data** dialog box appears. 2. Type the required text, and then click **OK** to save. ⓘ The text must not be less than two words or greater than 255 characters and that it is generally more effective to include more words than less. The data must be entered as it appears in the image, that is, each line in the image needs to be written in a separate line in the Data ID.
Matching	Sets the confidence level of word matching from 0 - 100 points.
Rect	Sets the exact area of where to identify the text. See Set the text area.

Set the text area

1. To activate the selection cursor, click **Rect property** line.
 The cursor in the Page Viewer changes from a hand to a crosshair.
2. Press the left mouse button and drag the cursor over the area to be selected.
 When you release the mouse button, a box appears over the selected area.
3. To edit the selection box, click the box.
 Drag points appear around the box allowing you to change the box size.
4. To move the entire box, press and hold the left mouse button.
 The cursor changes to a hand and you can now move the box on the page.
5. To deactivate the selection box, click elsewhere on the page.

Other properties

Property	Description
Learning	Sets the script to be used if the page is matched with a learning template.
Script name	A short name for the script, which identifies the type of forms that the script will cover. You can create many different scripts for the same form, and you can set the order in which each script is used in the Flow Settings.
Script weight	The weight (as a percentage) of the script score when computing the total score. The weight (as a percentage) of the learning score is, 100 minus the script weight.

Define databases

All databases are listed under the Databases category in the Explorer. To view the list of databases, click ⬅ next to the Databases category.
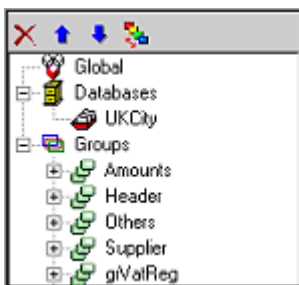
To view the Databases properties, click the name of the database in the Explorer. The list of properties is displayed in the Properties editor.

Create a database

Right-click the Databases category and select **New Database Table**. The new database appears under the Databases category. Configure the properties as described in the Database properties table. A database can be in ASCII or tab-delimited format.

Database properties

Property	Description
DataBase name	Select a database (entries in the list are as defined in Application Settings).
Case Sensitive	If selected, the database name becomes case sensitive.

Define groups and fields

A group refers to a number of fields, which have a mutually logical or topographical relationship. A topographical relationship refers to the positions of two fields have in relation to each other. For example, the Invoice and Date fields are generally located next to each other on a standard invoice document. Fields can also be connected by a logical process. For example, the fields **Net**, **Tax** and **Total** can be connected as follows: **Net + Tax = Total**.

A group consists of related fields and rules that define their relationship. A single group cannot contain all the fields, as large number of options and the relationships between all the fields may make the group ineffective. Therefore, it is recommended to create smaller, more powerful groups using strong rules.

Groups helps to find several fields at once. When running Freedom, the system first looks for groups of fields. For example, if "billing zip code" is usually located next to "shipping zip code" grouping these fields helps the system to quickly find these two fields (a positive recognition of the field).

Create a group

1. In the Explorer, right-click **Groups** and select **New group**.
   The new group, **Groups1** is displayed in the **Groups** node.
2. Double-click the new group.
3. Type a name and press Enter.
4. Set the group properties in the Properties editor pane.

Group properties

Property	Description
Max. Space	The maximum distance (number of lines) allowed to exist between fields in the group.
Maximize	Selects the best combination in the group. ⓘ This property's default should not be changed. Only advanced users should make changes, if needed. See Edit the Maximize property (advanced users only).

Property	Description
Required	At least part of the group is required. If no field in this group is recognized, the entire script fails.
OnPreRecognition	Event triggered before recognition of the group begins.
OnPostRecognition	Event triggered after recognition of the group is complete.

Edit the Maximize property (advanced users only)

By default, system lists all the fields in the rule and uses the following rule.

$$\sum FieldPCi - \sum FieldNCi$$

That is, the sum of the positive confidence minus the sum of the negative confidence.

ⓘ The Maximize property overrides the default maximize function.

To edit the **Maximize** property rules perform the following steps:

1. Click ⌷⌷⌷ to the right of the **Maximize property** line.
   The **Maximize** dialog box appears.
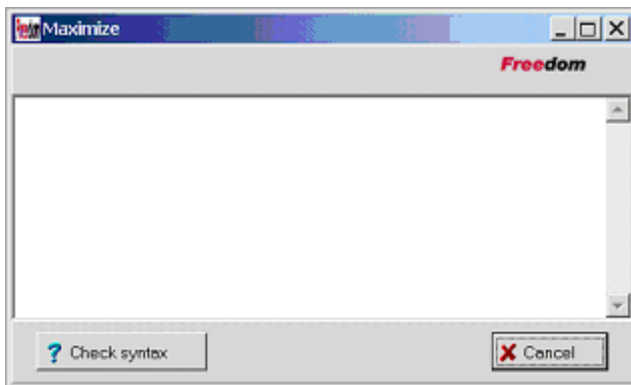
2. Hold down the Ctrl and . (period) keys simultaneously to view the following menu.

3. Double-click the word to select.

   The selected word appears in a dialog box.

4. Press the . (period) key to display the following menu.
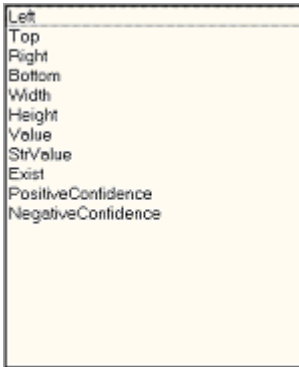
5. Double-click the required word to include it in the rule.

6. To check the syntax before saving, click **Check Syntax**.

> ⓘ Any errors are displayed on the bottom of the dialog box, and the cursor is automatically placed on the error in the text.
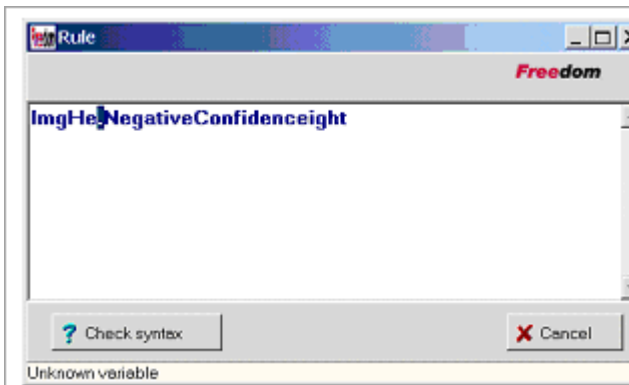
The system automatically performs a syntax check, and if no errors are found, saves the rule.

> ⓘ If you are using the default maximize property as the basis for your editing changes, you can use the DefMaximize property to input the default maximize value automatically. You can then simply enter additional criteria to the value.

Subgroups

Subgroups are the same as groups, but on a lower level of the hierarchy. You can create one or more subgroups within a group. The fields and rules within the subgroup are processed before

those of the group. You can create additional subgroups within a subgroup, located on yet a lower hierarchical level.

Example

A ShipTo group includes two subgroups: Name and Address. Different rules apply to each subgroup.

The Name subgroup uses a topographical rule to align the Name field to the top left. It contains a maximum space of two lines.

The Address subgroup includes a logical rule that defines the logical relationships between the City, State, and ZipCode fields. It may contain a maximum space of three lines.

Example:

The Address subgroup includes a ZipCode subgroup of two fields, ZipCode5 and ZipCode9 for zip codes consisting of five and nine digits respectively. The rule specifies that one (not both), of the two fields in the ZipCode subgroup must be completed.

Benefits

Subgroups improve the logical hierarchy and visibility. They also improve performance in two ways:

- Subgroups are processed before groups, so potential candidates can be eliminated earlier in the processing. The script will run faster.
- Rules can be applied more specifically to the appropriate fields.

Subgroup properties

Property	Description
Max. Space	The maximum distance (number of lines) allowed between fields in the subgroup.
Required	At least part of the subgroup is required. If no field in this subgroup is recognized, the group (or subgroup) to which this subgroup belongs is considered unrecognized.

Create a field

1. Click the relevant group.
2. Right-click the group and select **New Field**.
   A new field appears under the group.

3. To view the list of fields attached to the group, click .

Field properties

Configure the following properties for a field:

- Field properties
- Database properties
- Keyword properties
- Confidence properties
- Location properties

Field info properties

Property	Description
Type	Defines how the field data is recognized. • **TextOneWord**: Recognizes each word as a set of characters that make up a word, and not as individual characters. All characters can be included. • **Amount**: Recognizes numbers and related symbols, such as + - . $ %. • **Date**: Recognizes a combination of numbers and symbols such as / and -. At this stage, a specified date format does not need to be identified. • **Sentence**: Recognizes words separated by small spaces. • **Words group**: Recognizes the field as one group of words, not as individual words. • **NumericText**: Recognizes a combination of numbers and letters. For example, a standard invoice number may read as "A7456". • **Number**: Recognizes only numbers.
Style	**The type of writing:** Machine writing, Hand writing or Unknown writing.
Mandatory	If this checkbox is selected, and a field is not identified, the system applies the next script. If this option is not selected, the field is not mandatory. Therefore if the field is not identified, the system continues onto the next field.

Property	Description
Mask	A mask is a specified format or structure of specific fields. For example, a typical zip code is 2195. Therefore, a zip code mask would be @@@@, that is, any combination of four numbers. Numbers are represented by @. Characters are represented by #. Spaces and other characters, such as hyphens -, can also be included in the mask. A number of different masks can also be created for the same field. To create a mask, click 〔....〕. The **Editing Masks** dialog box appears. After you have created your mask, click **OK** to save and return to the Freedom Designer screen. ⓘ Masks are case sensitive. **Regular Expression**: One or more regular expressions may be entered in place of or in addition to the mask specification above.
Bad mask	Specific masks can be created which should be rejected by the system.
Validation (DLL)	An external DLL function that is used to control field recognition in addition to the freedom recognition. See Validation functions for more details.
Required	Field must be recognized. If not, then all fields in the group are unrecognized. ⓘ If one of the fields in the group is mandatory, then the script fails and the system will apply the next script. A required hierarchical child may fail a hierarchical parent. A field may fail a subgroup, and a subgroup may fail a group.

Database properties

Property	Description
Database Name	To select a database object, click ▾. A list of database names is displayed.
Field name	To select a field name, click ▾. A list of field names is displayed.
Weight PC	You can set the Positive Confidence level for database recognition. The figure is entered as points from 0 -100 - the greater the database confidence the greater the point. See Positive and negative confidence for more information.
Weight NC	You can set the Negative Confidence level for non-recognition of the database. See Positive and negative confidence for more information.
Complete	How complete is the database in percentages. For example, if the database contains only 65% of the valid data, the value should be 65. If the database is full, and all valid data is included in the database, the value should be 100.

Keyword properties
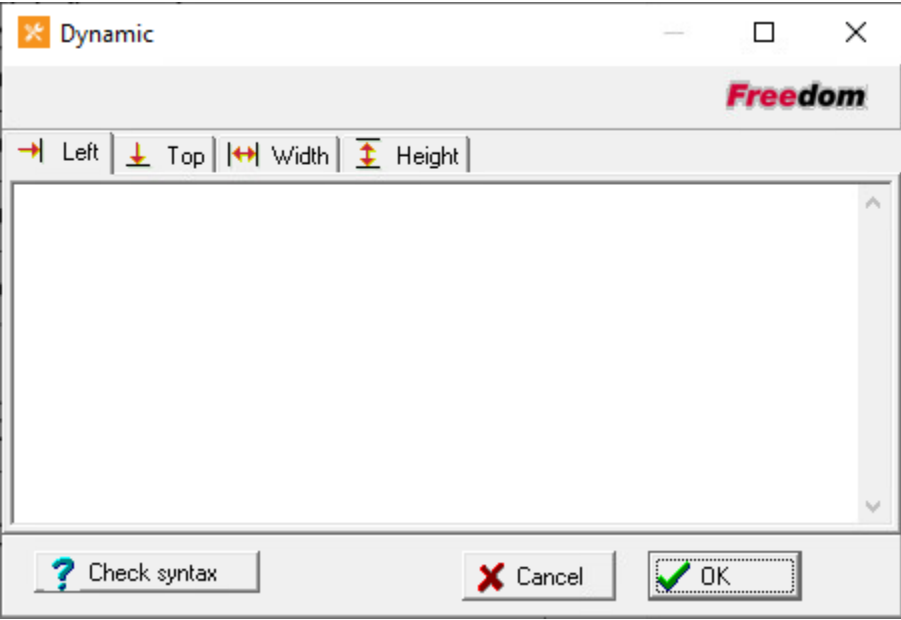
Property	Description
Keywords	Type the actual words, which will serve as the keywords. To type a keyword, click [...]. The Editing Keywords dialog box appears. Do not include the colon ":" symbol to the end of the word. For example, if the actual text reads Invoice No, then the keyword should read Invoice No without the colon at the end. Each keyword must be written on separate line. Even if a keyword appears on two lines in the image, for example, Unit total, it must still be written on one line only. After you typed the required keywords, click **OK** to save.
Location	This sets the general location or position of the keyword relative to the field. Click [ ] to view the options. For example, the Invoice Number is generally found in the top left area, relative to the field, then select the check boxes Left and Top.
Bad keywords	Allows you to define keywords which must be rejected. The process is the same as of the keywords.
Weight PC	Allows you to set the Positive Confidence level for keyword recognition. The figure is entered as points from 0 - 100. Greater the keyword confidence higher the points. See Set keyword weight for more information.
Weight NC	Allows you to set the Negative Confidence level for non-recognition of the keyword. See Set keyword weight for more information.
KFL Icr Engine	
KFL Name	

Confidence properties

Property	Description
Min PC	Allows you to set the Minimum Positive Confidence level. See Set confidence levels for more information.
MAX NC	Allows you to set the Maximum Negative Confidence levels. See Set confidence levels for more information.

Location properties

Property	Description
Rect	Allows you to set the exact location on the page to identify the text. See Set the text area for more information.

Property	Description
Dynamic	Defines the location of the field on runtime. To define a location, click [...]. The Dynamic dialog box appears. In the **Dynamic** dialog box, define the location of the field with respect to the tabs.

Move a field

To move an existing field from another group, click the relevant field, then holding down the mouse button, drag the field onto the target group.
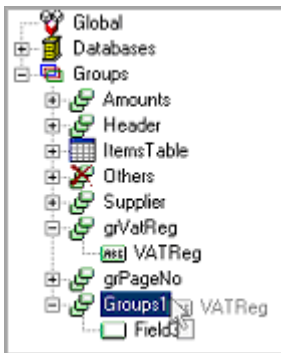
Enable or disable a group

To enable a group, right-click the selected field. From the context menu select Disable/Enable. The **Disabled** ⊠ sign is removed, showing that this field is now enabled.

Chapter 6

Group templates

eFlow offers the possibility of reusing existing design components. Your organization can maintain a set of common or generic templates of field groups, sub-groups and tables. For example, for a script that recognizes addresses. You can use the template to create new groups for the application.

In this chapter the term group refers to sub-groups and tables as well, unless otherwise specified.

Templates are created after a group has been designed, by exporting the group.

> ℹ The template/group connection is not dynamic. Changes made to a new group based on the template will have no effect on the template, and changes to a template will not affect existing designs that were added using the template.

Create a template by exporting

To export a group/subgroup/table, right-click the object to be exported.

The **Create Group Template** dialog box appears.
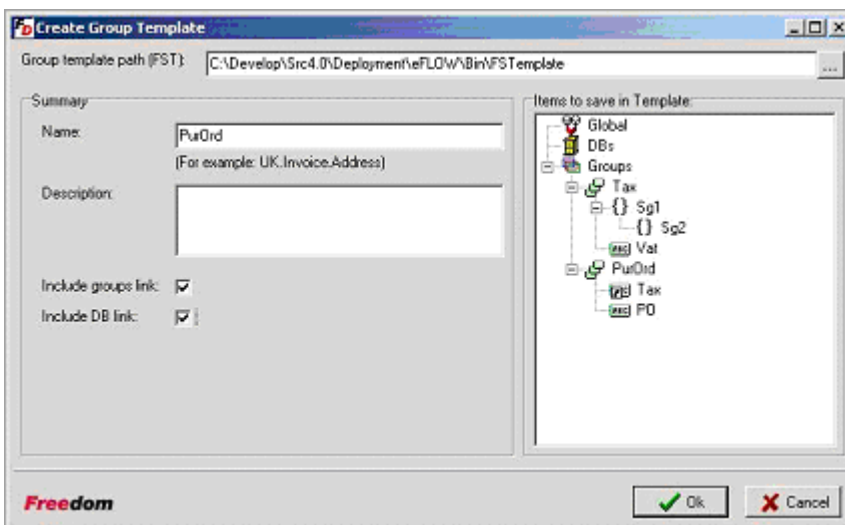
The following table describes the Create Group Temple window.

Option	Description
Group template path (FST)	Where the template is to be saved: Default path: `eFLOW 6\bin\FSTemplate` (Freedom script template).
Name	Name for the group template. The name can represent a hierarchical path using periods to denote levels. For example, UK.Invoice.Amount. A subdirectory is created for each level in the explorer. Spaces are permitted in the name.
Description	Provides information to be displayed when you browse for a template for use (see Import a template).
Include groups link	Select this check box to include subgroups in the template.
Include DB link	Select this check box to save the database definition (and in the case of FDDB, saves the text file as well).

Import a template

Groups, subgroups and tables can be created based on a template by importing a previously-exported group template.

You can either add a new group, or overwrite an existing one so that the template definitions are applied.

To use a group template:

1. Right-click the **Groups** and select **Import**.

    The **Import Group Template** dialog box appears.

Option	Description
Group template path (FST)	The default path is displayed. Select within the hierarchy of categories to display the list of templates under a specific branch, and select the desired template.
Overwrite	When Overwrite is selected, the selected group is overwritten. ⓘ Not applicable for the highest-level Groups category.
Name Prefix	String to prepend for all fields in the new group to make the fields unique. This field is optional. Prefixing names helps to differentiate one field from another, especially in scenarios where the same template is used more than once in the application. For example, prefix vendor in an address group, so that vendor-city and vendor-zip can be differentiated from customer-city and customer-zip.
Group Name	Name for the new (imported) group.

2. Click **Next**.
3. Specify the mapping between the template fields and script fields.
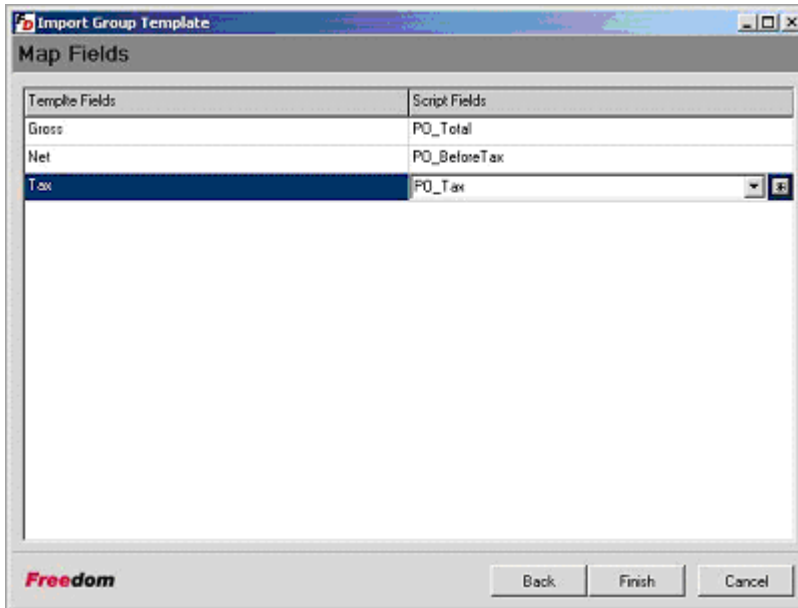
You can map each field either to an existing field or to a new field.

> ⓘ If you choose an existing one, it is moved from its original position in the tree to this group.

4. To create a new field, click ⊞ and type a new field name.
    The prefix string is prepended to the string you enter.

5. Click **Finish**.
    The newly defined group appears in the Designer.
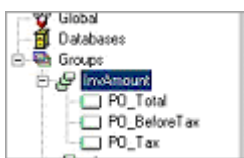
Database mapping

If the template was exported with a link to a database specified (Include DB link checkmark), the mapping databases step is done at this point in the process. For example, when an address template uses the US Zip database (table); the same table can be used, or another data source can be specified.
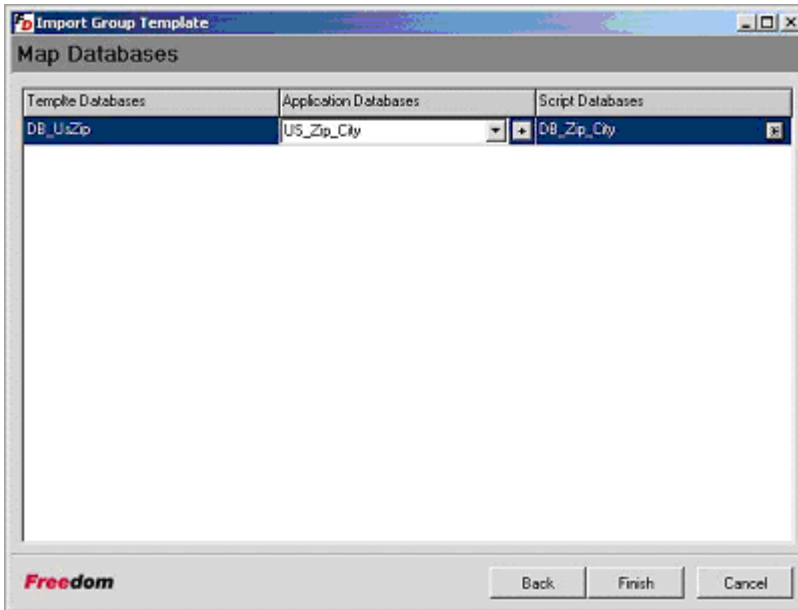
If you select a database that is used in the application and is also already used (defined) in this script, the value in the Script Database column appears automatically.

ℹ Database mapping must be done with databases that have the same field structure.

If the database is not defined in the script yet, click ⊞ in the **Script Database** column and specify a name for the database in the script. The database is now added to the list of databases in the application.

Group template limitations

A group or subgroup template cannot be used to create/define a table, and a table template cannot be used to create/define a group or subgroup.

A group with a custom Maximize function cannot be imported as a subgroup, such a group can only be imported via Groups at the top level of the application.

Define tables

Tables are made up of columns and rows, which make up individual fields. You can associate keywords, rules and confidence levels with these fields, which the system uses as a basis during the recognition process.

Heading 1	Heading 2	Heading 3	Heading 4
XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
Field 1	Field 2	Field 3	Field 4
XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX

Create a table

In the **Explorer**, right-click **Groups** and then select **New Table**.
The new table **Table 1** is displayed below the **Groups** category.

Table properties

Group	Property	Description
Row Detection	Weight PC	Weight given to a built-in algorithm for identifying table rows. This weight affects the PC of all fields in the table.
	Weight NC	Weight given to a built-in algorithm for identifying table rows. This weight affects the NC of all fields in the table.
Threshold	Max not found	Defines the number of required fields that were not recognized logically (by mask, keyword or database), but were recognized topographically.
		For example, if there are 4 required fields and the Max not found is 2.
		If 1 or 2 fields were found, but the value was not recognized, the line is acceptable. If 3 or more fields are found (topographically - but not logically) - the whole line is eliminated.
Events	OnPreRecognition	Event triggered before recognition of the group begins.
	OnPostRecognition	Event triggered after recognition of the group is complete.

Group	Property	Description
Other	Fix row dis.	Improves recognition in case the table has a fixed distance between rows.
	Required	At least part of the table is required. If no field in this table is recognized, the entire script fails.
	Lines in row	Number of lines in one row.
	Max rows in table	Maximum number of rows to be recognized on the page.
	Maximize	Selects the best combination of fields in the group. ⛔ The default property should not be changed. Only advanced users should make changes if needed. To make changes see Edit the Maximize property (advanced users only).

Create a table field

1. Select the relevant table.
2. Right-click the table and select **New Column**.
   A new field is displayed below the table.
3. To display the list of fields attached to the table, click 🔲.

Table field properties

Most of the properties are regular field properties. See Field info properties for details.

Additional properties for tables are available in the Column group.

Property	Description
Alignment	Use the drop-down list to select the required alignment (Left, Right, Unknown, None) of the field within the table. For example, a table for prices, which contains numbers, would generally be aligned to the right of the table. **Unknown** means that there is Left or Right alignment but in some images it is right aligned while in others it is left. **None** means that the field has no consistent position in the table.
Continuous	
Fix Width	When selected, the column width remains constant.

Property	Description
Vertical Movement	If the field's vertical location inside a row is able to change, this property describes the number of lines the field can be moved relative to the previous column. In the following example the EAN number is one line away from the PartNo (Artikel-Nr.) in the first row, and two lines away in the second row. In this case the Vertical movement should be set to 1.

Field order within tables

The order of fields attached to tables is taken from the field order as it is found in the list of fields in the Field category.

> ⓘ The first column must be set as Required.

Changing the order of the fields affects recognition. The order of the fields in the Field category can be changed in one of the following ways:

- Select the field and use the 🔼 and 🔽 arrows.
- Right-click the required field and select the required option from the drop-down menu.

Move a table field

To move an existing field from another table, click the relevant field, hold it and drag it onto the table. The field is displayed below the table.
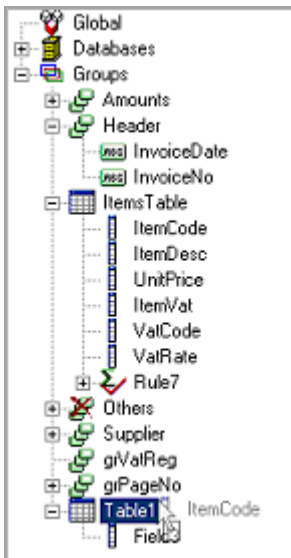
ⓘ If tables are being used, then keyword confidence levels should not be set high. Only general rules should be set for rows.

Define rules

You can define rules for each field or group of fields to indicate how the system should process the form.

A rule influences the recognition by changing field PC & NC confidence. Any field that is attached to a rule is referred to as an Influence Field because it influences confidence levels. Influence fields are displayed with ![icon] icon and contain the Weight PC and Weight NC properties. See Set confidence levels.

Mandatory rules

Mandatory rules are a special kind of rule that do not affect the confidence level. Mandatory rules return either values: true or false. If true, the rule has no effect. If false, the rule eliminates a potential combination of field candidates from consideration thereby improving script logic and overall performance.

The script runs faster if potential candidates are eliminated by a mandatory rule at the beginning of the process.

Create a rule

1. In the **Explorer**, select any group.
2. Right-click the group and select **New Rule**.
   In the **Explorer**, a new rule is added as **Rule 1** under the group.
3. Double-click the rule to type a name, and then press Enter.
   Example: Validate ID.

Rule properties

To display the rule properties, click on the required rule in the Explorer. The properties editor is displayed where you can define a rule using the Rule editor. See Configure rules.

Configure rules

1. To use fields from another group in your rule, drag the required group that the field belongs to, onto group.

    The new group is added to the group.

    > ⓘ The icon next to group changes.

2. Click ⌊…⌋ to the right of the **Rule** property.

    The **Rule** dialog box appears.
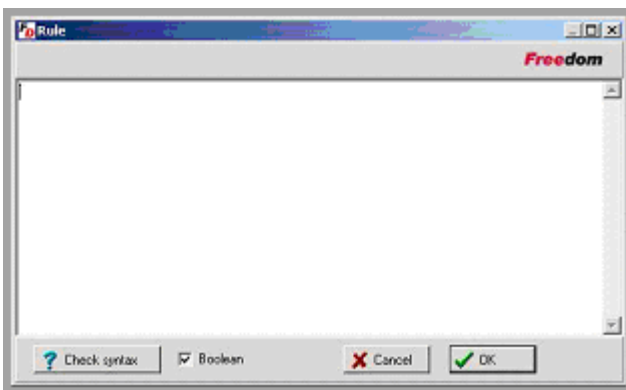
3. Select the **Boolean** check box, to specify that only results of True and False are produced. If the **Boolean** check box is cleared, eFlow returns a confidence level between 0 and 100. Result is 0 if the rule fails completely, and 100 if the success is complete. For example, the rule DBFind() can return the database matching confidence.

4. To view the different categories and corresponding options, first click in the dialog box so that a flashing cursor appears, then hold down the Ctrl and period . keys simultaneously.

    The following menu appears.
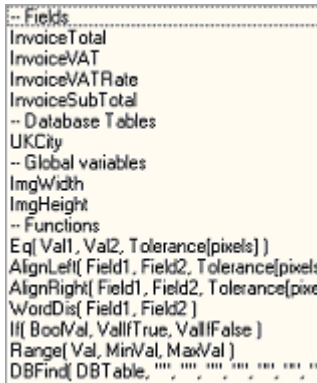
5. Categories are represented by a dash "-", before the heading. For example, - Fields. To select a word under a category double-click it. The selected word appears in the dialog box.

The following categories are displayed.

Category	Option	Description
Fields		Displays all the relative fields, which may be used in the rule.
Database tables		Displays all the database tables.
Global variables	ImgWidth	Image width.
	ImgHeight	Image height.
Functions	Eq(Val1, Val2, Tolerance[pixels])	Val1 is equal to Val2 (+- Tolerance in pixels).
	AlignLeft(Field1, Field2, Tolerance[pixels])	Field1 is aligned to Field2 on the left side (+- Tolerance in pixels).
	AlignRight(Field1, Field2, Tolerance[pixels])	Field1 is aligned to Field2 on the right side (+ - Tolerance in pixels).
	WordDis(Field1, Field2)	Returns the number of words between these two fields. For example, if the two fields appear one after the other the WordDis() will return 0.
	Call(<Dll name>, <Fun name>, sPar, iPar)	
	If(BoolVal, ValIfTrue, ValIfFalse)	
	Range(Val, MinVal, MaxVal)	Val1 is between Val2 & Val3.
	DBFind(DBTable, Field1, Field2, Field3, Field4, Field5, Field6, Field7, Field8)	Returns matching confidence of DB query. DBTable refers to the DB object name. Field(n) is a string to match the field database.

6. For the field options, press the Ctrl and . (period) keys together.

The following menu appears.
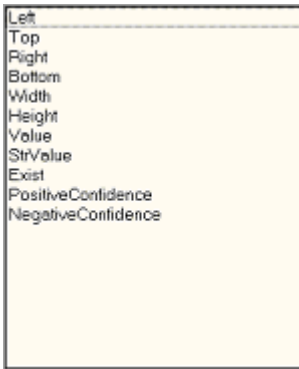
7. Double-click the required word, to include it in the rule.

   The examples of possible common rules are:
   - Two fields are in the same line:

     Eq (Field1.top, Field2.top, 15)
   - Two fields having the same height and Field 1 is to the left of Field 2:

     Eq (Field1.height, Field2.height, 3) and (Field1.right < Field2.left)
   - Field 1 is equal to Field 2 multiplied by ten:

     Field1.value = Field2.value * 10

8. To check the syntax before saving, click **Check syntax**. The system automatically performs a syntax check and displays the results in the dialog box. Any errors are displayed at the bottom of the dialog box, and the cursor is automatically placed on the error.
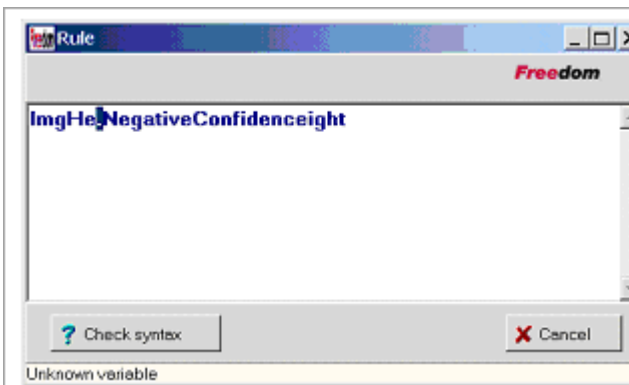
If no errors occur, the rule is saved and the system returns to the Freedom Designer screen.

Rule syntax

The operators that can be used in rule syntax are described in the following table.

Operator	Description
+	Addition

Operator	Description
-	Subtraction
*	Multiplication
/	Division
And	X and Y
Or	X or Y
()	Parentheses
>	Greater than
<	Lesser than
>=	Greater than or equal to
<=	Lesser than or equal to
=	Equal For example, V1=V2 means that |V1 - V2|=0
==	Equal +- (more or less) For example, V1==V2 means that |V1-V2|<1
!=	Not equal +- (more or less) For example, V1 != V2 means that |V1-V2|>1
!	Not equal For example, V1 ! V2 means that |V1-V2|>0

Define field confidence levels

Define the influence, which the total confidence levels of a field will have.

Select the required field in the Explorer. The following properties are displayed in the Properties editor.

Property	Description
Weight PC	Allows you to set the positive confidence weight. See Set PC and NC weight for rules for more information.
Weight NC	Allows you to set the negative confidence weight. See Set PC and NC weight for rules for more information.

Allocate influence fields to a rule

To allocate influence fields to the new rule that was created, perform the following steps:

1. To expand the **Groups** category, click .
    The list of fields is displayed.

2. Click the required field and drag and drop the field on the rule.
The field is now attached to the rule.

> ℹ The influence field has only the **Weight PC/NC** properties attached to it.

3. Click ⊡ next to rule to view the field.
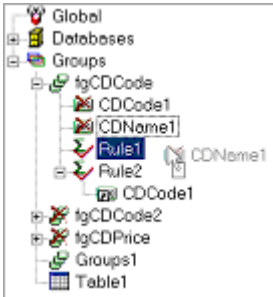
> ℹ You can allocate many fields to the same rule.

Set confidence levels

This chapter describes topics, such as scoring logic, calculate scoring, confidence, and weights.

Scoring logic

The following image depicts the scoring logic that illustrates how Freedom calculates the field score. Each level has setup weight that calculates the level's score. This score then goes to the next level above it, up to level 0. You can control the weight of each module in this scheme. See Scoring in detail for an explanation of the different levels.

ⓘ All objects surrounded by dashed ellipse are used to set the score weight. In this scheme we ignore the Positive Confidence and Negative Confidence.
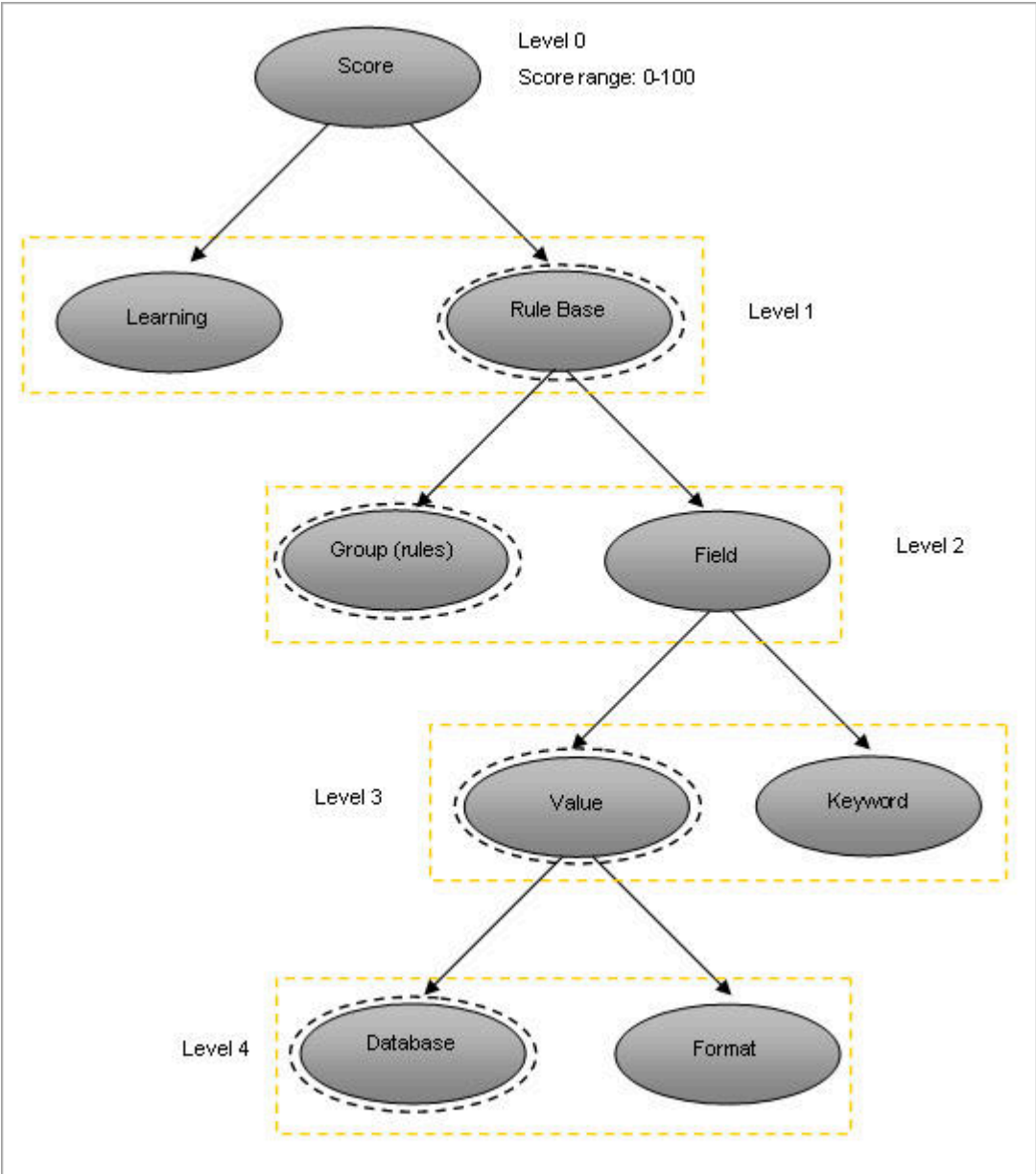
Calculate scoring
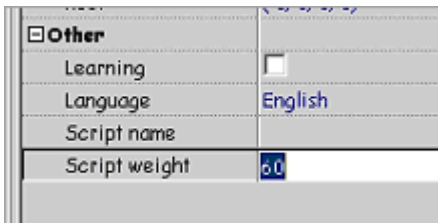
Each module in the Scoring scheme returns a field confidence. The scheme consists of the following four levels.

Level 1

This level includes the following two modules:

- **Learning module**: Returns the confidence based on the Learning module.
- **Rule Base module**: Returns the confidence based on predefined rules, such as Format, Location, and Specific values.

The weight between these two modules is set in the **Other** field property: **Script weight**. This setting ensures that all fields in the script have the same weight.

> ℹ️ In all other levels the weight is set per field.

Level 2

This level includes the following two modules:

- **Group module**: Returns the confidence of a field based on Freedom rules. These rules can be used to check the field in relation to other fields.
- **Field module**: Returns the confidence of a field, based on predefined rules.

The weight between these two modules is set automatically based on the Maximal possible rule confidence.

For example:

Consider two rules: Rule 1 and Rule 2. In Rule 1, Field A can get 20 points and Rule 2, the Field A can get 30 points. So, the maximum rule confidence is 20+30 = 50. The Field module is always given up to 100 points. So the maximum total points that can be achieved is 50+100 = 150. The Group module weight will therefore be 33% (as 50 is 33% of 150).

Level 3

This level includes the following two modules:

- **Value module**: Returns the confidence of the setup method that is relevant to the field value only.
- **Keyword module**: Returns the confidence based on a matching keyword related to the field.

The weight between these two modules is set in the **Keyword** field properties: **Weight PC** and **Weight NC**.

Level 4

This level includes the following two modules:

- **Database module**: Returns the confidence of the field while matching the field value against an external database.
- **Format module**: Returns the confidence of the field based on the Mask, Field type and external DLL function.

The weight between these two modules is set in the **Database** field properties: **Weight PC** and **Weight NC**.

Positive and negative confidence

Freedom uses two different views of confidence: Positive and Negative.

Positive Confidence means how close you are to the correct result.

Negative Confidence means how far you are from the correct result.

Therefore, in all cases (except Learning), you set two weights: one for the Positive confidence and the other for the Negative confidence. In the Scoring Scheme, the Positive and Negative confidences are ignored, but there are two identical scorning schemes, one for the Positive confidence and the other for the Negative confidence.

Thus, Final Score = Score_PC - Score_NC

The following examples explain this concept.

Example 1

Keyword weight PC: 50

Database weight PC: 50

No rules

No learning (Script weight = 100%)

Calculate weight

Keyword weight = 50%	Database weight = 50 * (100-50) / 100 = 25%	Learning weight = PC = 0% & NC = 0%	Field type weight = 100 - 50 - 25 = 25%

Freedom results

Module	Result
Keyword	100% fit = 50 points
Database	25% fit = 25% of 25 = 6.25 points
Field	50% fit = 50% of 25 = 12.5 points
Total Points for PC	50+6.25+12.5 = 68.75 points

Example 2

Keyword weight: 25

Database weight: 33

No rules

No learning (Script weight = 100%)

Calculate weight

Keyword weight = 25	Database weight = 33 * (100-25) / 100 = ~25	Learning weight = PC = 0% & NC = 0%	Field type weight = 100-25-25 = 50

Freedom results

Module	Result
Keyword	75% fit = 75% of 25 = 18.75 points
Database	80% fit = 80% of 25 = 20 points
Field	75% fit = 75% of 50 = 37.5 points
Total Points for PC	18.75 + 20 + 37.5 = 76.25

Example 3 - City field

The City field is mostly based on the Cities database but two rules are used to check that the city is near the Zip code.

Setup weight:

No keyword

Database weight: PC = 100 and NC = 100

Two rules:

- Rule1 - Influence City field with PC = 50 and NC = 0
- Rule2 - Influence City field with PC = 50 and NC = 50

No learning (Script weight = 100%)

Calculate weight

Rule 'Maximal possible rule confidence' is PC = 100 & NC = 50

Rule1 - Weight PC = 25% & NC = 0%

Rule2 - Weight PC = 25% & NC = 33%

Keyword weight = PC = 0% & NC = 0%	Database weight = PC = 50% & NC = 66%	Learning weight = PC = 0% & NC = 0%	Field type weight = PC = 0% & NC = 0%

Freedom results

Module	Result	Overall result
Database	PC = 80% NC = 20%	PC = 80% of 50% = 40 points NC = 20% 0f 33% = 7 points
Rule 1	Succeed PC = 50 points, NC = 0	PC = 50 of 100 of 50% = 25 points NC = 0 of 50 of 33% = 0 points
Rule 2	Fail PC = 0 points, NC = 50	PC = 0 of 100 = 0 points NC = 50 of 50 of 33% = 33 points
Final Score		PC = (40+25+0) = 65 NC = (7+0+33) = 40

Example 4 - Delivery Date field

The Delivery Date field is mostly based on Mask and Keyword, but the Learning module is also used.

Setup weight:

Keyword weight: PC = 50 and NC = 50

No Database

No Rules

Script weight = 40%

Calculate weight

Keyword weight = PC = 20% and NC = 20%	Database weight = PC = 0% and NC = 0%	Learning weight = PC = 20% and NC = 20%	Field type weight = PC = 60% and NC = 60%

Freedom results

Module	Result	Overall result
Format	PC = 80% NC = 0%	PC = 80% of 20% = 16 points NC = 0% 0f 20% = 0 points
Keyword	PC = 50% NC = 20%	PC = 50% of 20% = 10 points NC = 20% 0f 20% = 4 points
Learning	PC = 80% NC = 5%	PC = 80% of 60% = 48 points NC = 5% of 60% = 3 points
Final Score		PC = (16+10+48) = 74 NC = (0+4+3) = 7

The sections Set keyword weight and Set PC and NC weight for rules explain the concept of confidence levels and provides examples of the general confidence level settings, which you can use.

Two thresholds are defined:

1. **Minimum Positive Confidence (Min PC)**: Sets the level at which the attained confidence must be above to be accepted.

2. **Maximum Negative Confidence (Max NC)**: Sets the level at which the attained confidence must be below to be rejected.

The Freedom algorithm compares the PC parameter to the Min PC, and the NC parameter to the Max NC.

A field is accepted only if, (PC >= Min PC) and (NC < Max NC)

In other words, the Positive Confidence must be equal or larger than the defined Min PC and the Negative Confidence figure must be lower than the defined Max NC.

Set keyword weight

Once a keyword is defined, set the weight for the keyword to define its importance by setting the Positive Confidence weight (Weight PC) and Negative Confidence weight (Weight NC).

The following examples explain the allocation of PC and NC weight points.

1. Keyword does not always exist (means it is not found on the form).

Weight PC	Weight NC
20	0

The PC is set low and the NC set to 0, because it is not important whether the keyword is recognized as it may not be on certain forms at all.

2. Field is only be found through the keyword.

Weight PC	Weight NC
100 - 80	30

The PC is set very high because the keyword is essential to find the field. The NC is also set higher because not finding the keyword should cause the field to be rejected and positive recognition cannot be made.

3. A field and character mask helps you to identify the field. However, the form may contain similar fields and therefore you need to set a new keyword to fine tune the recognition of the field.

Weight PC	Weight NC
60	80

The NC is set high because if there are other similar fields, and if the keyword is not found, the field should be rejected.

Set PC and NC weight for rules

Once a rule is defined, set the weight of the rule, to define its importance by setting the Positive Confidence Weight (Weight PC) and Negative Confidence Weight (Weight NC).

The following examples explain the allocation of PC and NC weight points for rules.

1. The rule is not always correct. For example, it is not clear if the alignment of the field is to the right of the second field. In this case we know that there is some type of alignment, but it may not be exactly as stated in the rule.

Weight PC	Weight NC
20	0

In this case, PC is set low and NC is set to 0 because even if the rule is not fulfilled, the field is not rejected.

2. The rule must be fulfilled. For example, when two fields must be in the same line.

Weight PC	Weight NC
100	100

In this case, both the PC and NC are set to the maximum level, because of the rule being absolute.

3. A bad OCR or an exact rule. For example, Net+Tax=Gross.

Weight PC	Weight NC
100	20

As this is an exact rule and must be totally compliant, PC is set to the highest as the rule will only be accepted if the confidence is 100 percent. While the NC is set low because the rule will be rejected even for slight difference.

4. The field should not be recognized, that is, a negative rule.

Weight PC	Weight NC
0	100

In this case, PC is set to 0, while NC is set to 100, because the field should be rejected if the rule applies.