Advanced Topics

Rintagi
Applications

User
Guide

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Advanced Features

As mentioned earlier, a functional screen can be developed within 5 minutes using our standard features. More sophisticated developers, however, may want further customization. For example, users may want to change button names, hide or show buttons, add business rules, etc. In this chapter, we will address functionality more suitable for developers who have more advanced programming knowledge and experience, to better handle situations where business rules require understanding of standard programming languages, such as SQL, C# or JavaScript.

Using this program, sophisticated developers may perform some of the following advanced functions:

- Screen criteria setting
- Screen layout grouping
- Button characteristic override
- Server rule setup
- Web rule setup
- Client rule setup
- Advanced rule setup
- Message center maintenance
- Automatic human language translation

Screen Criteria Setting

In order to streamline data transfer between the data server and the web server, developers may specify a range of commonly used criteria for a desired screen. Users can filter based on the specified criteria, and only data that meets those criteria will be retrieved from the database. This feature significantly reduces unnecessary traffic, improving performance without sacrificing quality.

There are two types of screen criteria:

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1. User Defined Criteria: Users create and name their own SQL.

2. Mapped Criteria: Users can map criteria (one-to-one) to a column on the table specified for that screen.

User Defined Criteria

This is most useful for complex criteria that may involve some hard-coded constants to be specifically filtered. Users write their own SQL, and attach a culture-dependent name to it. Each name specified will be listed on the drop-down at the top of the screen (to the right of the criteria section), and can be ordered in any sequence the user desires.

Command: Client Tier -> Screen Filters

The result is shown as follow on the right:

The latter criteria type consists of a two-steps process. First, a screen criterion is defined (as shown below), which is then mapped to the appropriate screen column with the appropriate operator.

Screen Criteria Defined

Command: Client Tier -> Screen Criteria

To add new criteria to a screen, first select the appropriate screen from the criteria section. Notice that this dropdown selection is actually a screen criteria defined by the same action. This is the power of self-generation as Rintagi is also built from this meta-data.

One built-in service worth mentioning is that the application generated will always memorize each user's last selection for each individual screen or report and will be filtered accordingly next time the screen or report is invoked by the same user.

If the selected screen already has some criteria, the search list below the criteria section will list all existing criteria. As with all other screens, the user may choose from a blank row to add a new row or copy an existing row to be modified. Some rows may not accept exact duplicate. In which case the unique column should be identified and modified prior to duplicating to the database.

Schema Characteristic	Description
Screen	This is the screen this criterion applies.
Criteria Group	This is the criteria group this criterion belongs; all groups should root from the same default group. This will be covered in details in the following topic.
Criteria Column	The column that this criteria should influence. This will be used to determine the data type of this criterion.
Tab Index	This is the tab order of this criterion at a default interval of 10. If and when not assigned a value or the last digit is not zero, an automatic reorder will take place.
Display Mode	This is the display type of this criteria column.
Justify	This is the justification of column display (Left, Right or Center).
Column Size (px)	The column size of this criterion in pixels.
List Row Size	The number of rows to show if this criterion is a list-box. Most of the time this is empty.
Dropdown Key Column	The key column of the dropdown, combo-box, list-box, radio-button.
Dropdown Ref Column	The display column of the dropdown, combo-box, list-box, radio-button.

Dropdown Sort Column	When not specified, the reference column will be used for sorting.
Require Validation	When checked, this criterion becomes mandatory.
Culture	The culture for this criteria label, default culture should present on one of the rows.
Column Header	The heading for this criteria column is 50 characters or less.
Width	The width of this heading in pixels if default is not applicable.

Screen Criteria Mapping

Command: Client Tier -> Screen Criteria Mapping

The criteria map determines the filter operation based on a simple operator. Only four pieces of information are required for each criterion. (Note: Code generation will produce an error if this step is not performed).

Schema Characteristic	Description
Screen	Criteria and columns on this screen will be mapped.
Database Column	Database column to map the criteria to.
Operator	Mapping operator between database column and criteria.

Criteria Column	Criteria to map to the selected database column.

Screen Layout Grouping

Although not a graphical operation, this feature captures all of the necessary functionality that enables screen criteria and screen columns to be presented in an organized manner. For example, columns or criteria may be displayed side-by-side in two columns by simply defining two groups within a group and specifying that the content (the two groups) be displayed horizontally. For the most effective use of this feature, the user should storyboard the layout prior to defining the groups.

Command: Client Tier -> Screen Grouping

Schema Characteristic	Description
Screen	The screen that this group applies to.
Group Type	Selects the appropriate criteria/column type.
Group Index	Computed based on the order of columns assigned.
Parent Group	The parent screen group. Users should ensure the same root for all groups within this screen.

Group Name	The unique name for the group within this screen.
Content Vertical	Check this if content should be stacked vertically.
Label Vertical	Check this if label should be on top of the corresponding content.
Border Width	Number of pixels for the group box border. (Example: "Zero" leaves the group box borderless.)

Button Characteristic Override

Action buttons can be styled and characterized at two levels. These buttons are predefined to serve any screen, report or wizard. The " Button Defaults" screen allows the button names and tool tips to render in the human language desired as the default. The "Button Overrides" screen can then override these button characteristics.

It is strongly advised not to add more buttons or make changes to this screen as next Rintagi upgrade may remove any modification made to this screen.

Button Defaults

Button Characteristic Default   Export   RichText   Undo All   Save

Culture: U.S. English

30   1 of 2   Filter All On

Culture*	Button Type*	Button Name*	Button ToolTip*	Delete_All
U.S. English	Report Clear Criteria	Clear	Press this to clear criteria section	Delete
U.S. English	Report Customization	Customize	Press this to customize this report further	Delete
U.S. English	Report Export Doc	Word	Press this to view results in a Microsoft Word file	Delete
U.S. English	Report Export Pdf	PDF	Press this to view results in an Adobe PDF file	Delete
U.S. English	Report Export Rtf	RichText	Press this to view results in a Rich Text format (RTF) file	Delete
U.S. English	Report Export Txt	Export	Press this to export as tab-delimited to flat file or Excel Spreadsheet	Delete
U.S. English	Report Export Xls	Excel	Press this to view results in an Excel Spreadsheet	Delete
U.S. English	Report Export Xml	Excel	Press this to view results in a XML-formated Excel SpreadSheet version 2000 and beyond	Delete
U.S. English	Report Global Search	Search	Press this to show global criteria section	Delete
U.S. English	Report Print	Print	Press this to view results on screen and print to the printer selected	Delete
U.S. English	Report Show Criteria	Criteria	Press this to show criteria section	Delete
U.S. English	Report View	View	Press this to view results on screen	Delete
U.S. English	Screen Clear	Clear	Press this to clear this form for the same record and assume initial defaulted values	Delete
U.S. English	Screen Clear Criteria	Clear	Press this to clear criteria section	Delete
U.S. English	Screen Copy	Copy	Press this to copy the current contents to a new form	Delete
U.S. English	Screen Copy & Save	Copy&Save	Press this to copy the current contents to a new form and create this record	Delete
U.S. English	Screen Delete	Delete	Press this to delete this record permanently	Delete
U.S. English	Screen Export Rtf	RichText	Press this to export all data based on criteria as rich text to an RTF file or to Microsoft Word	Delete
U.S. English	Screen Export Txt	Export	Press this to export all data based on criteria as tab-delimited to flat file or Excel Spreadsheet	Delete

These become basic default characteristics for action buttons if there is no override. Overrides display using a desired image, text, etc. Many buttons from the above are

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not visible as default. Grid import is one of them. You may elect those buttons to override and assign web-rules to these buttons with your desired characteristics.

Button Overrides

Schema Characteristic	Description
Culture	The culture this button override represents.
Screen	The screen this button characteristic will override, if appropriate
Report	The report this button characteristic will override, if appropriate.
Wizard	The wizard this button characteristic will override, if appropriate.
Button Type	The button type this override should apply.
Alternate Name	The alternate name to be displayed on this button type. (Blank means no change to the default.)
Alternate Tool Tip	The alternate tool tip for this button type. (Blank means no change to default.)

Visible	Check this if button type should be visible.
Image	Check this if button type should be an image.
Image URL	The relative path to an alternate image if the previous checkbox is checked.

Server Rule Setup

Server Rule Setup is among the most commonly used of all business rules. Any rule defined in this layer will affect only the data. The developer may code rules in this layer using standard SQL as stored procedures. Rules in this layer can be categorized into one of the following:

1. Constraints: Conditions required for successful data entry or user-defined error message will be prompted.

2. Computation: Typical "A + B = C" scenarios, all mathematical formulae can be entered in this format.

3. Inference: Typical "IF A THEN B" scenarios, if a user-defined condition is met then change designated data accordingly.

4. Action Enabler: Any action that cannot be classified as one of the above. Typically used to initiate an external action.

Rule Type*: Inference

Screen:

aster Table: Action Enabler

:xec Order*: Computation
              Constraints
Jure Name*: Inference

The above rules are mutually exclusive, comprehensive and can be initiated by any combination of "Update", "Insert or "Delete" actions. Developers may even choose to fire individual rules immediately before or after these standard actions.

Server Rule: Tab #1

Command: Rule Tier -> Server Rule

Server Rule

Export | RichText | New | Copy | Undo All | Save | Delete

Screen: Screen Column Properties

Screen Column Maintenance 10: Update Group Index   Module: Administration

Main Info | Content

Rule Name*: Update Group Index
Description: Keep Column Group Index Uptodate
Rule Type*: Inference
Screen: Screen Column Properties
Master Table: ☑
Exec Order*: 10
Procedure Name*: Ir_UpdScreenGrpIndex
Parameter Names: ScreenId
Parameter Types: Int
Calling Parameters: ScreenId14
On Add: ☑
On Update: ☑
On Delete: ☑
Before CRUD: ☐

Server Rule: Tab #2

Server Rule

Export | RichText | New | Copy | Undo All | Save | Delete

Screen: Screen Column Properties

Screen Column Maintenance 10: Update Group Index   Module: Administration

Main Info | **Content**

S.Procedure:
```
CREATE PROCEDURE Ir_UpdScreenGrpIndex
  @ScreenId        int
/* WITH ENCRYPTION */
AS
SET NOCOUNT ON
DECLARE  @ParentGrpId     int
        ,@ScreenGrpId     int
        ,@ii              int
        ,@PrevPid         int
        ,@Pid             varchar(20)
-- Use four levels get around not having recursive function.
IF object_id('tempdb.dbo.#Cri1') is not null DROP TABLE dbo.#Cri1
IF object_id('tempdb.dbo.#Cri2') is not null DROP TABLE dbo.#Cri2
IF object_id('tempdb.dbo.#Cri3') is not null DROP TABLE dbo.#Cri3
IF object_id('tempdb.dbo.#Cri4') is not null DROP TABLE dbo.#Cri4
IF object_id('tempdb.dbo.#Obj1') is not null DROP TABLE dbo.#Obj1
IF object_id('tempdb.dbo.#Obj2') is not null DROP TABLE dbo.#Obj2
IF object_id('tempdb.dbo.#Obj3') is not null DROP TABLE dbo.#Obj3
IF object_id('tempdb.dbo.#Obj4') is not null DROP TABLE dbo.#Obj4
```

Modified By: Nelson Lin   On: 2/10/2007 5:05:13 PM Last Generated: 2/10/2007 5:05:13 PM

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To use any server rule effectively, users must first create the stored procedure, and then use the Query Analyzer feature to assure that the stored procedure functions properly. The "Synchronize to Db" icon will alert the user to any syntax error.

Click here to synchronize this stored procedure to the physical database immediately.
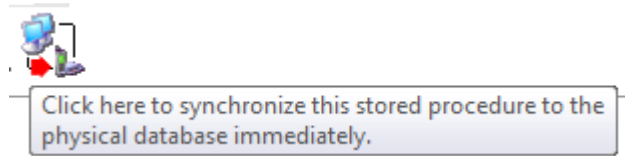
The stored procedure created will be called from within the Data Access layer.

Schema Characteristic	Description
Rule Name	The unique name for a server rule (100 characters or less).
Description	The detail description for the server rule.
Rule Type	The rule type (constraint, computation, inference or action enabler) for the server rule.
Screen	The screen to apply this server rule to.
Master	Check if this server rule applies to each row of the master table; uncheck if rule applies to detail table.
Exec Order	The order of execution for this server rule. A re-order is automatic if last digit is non-zero or ignored.
Procedure Name	The procedure name of this server rule (20 characters or less).
Parameter Names	The parameter names used in the stored procedure (comma-delimited, if needed.)
Parameter Types	The data types describing the above parameters (comma-delimited, if needed.)
Calling Parameters	The matching calling parameters with trailing table ID and comma-delimited, if any. LUser.?, LCurr.? and Config.? can be used.
On Add	Check if this initiates when adding a row.
On Update	Check if this initiates when updating a row.

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On Delete	Check if this initiates when deleting a row.
Before CRUD	Check if this initiates before Insert, Update or Delete.
S.Procedure	This content will be executed, as Stored Procedure (SQL) on the relevant database(s) when field is not empty.
Modified By	Identifies the user that last modified this.
On	Captures the date and time of last modification for tracking purposes.
Last Generated	This stored procedure was last generated on this date.
Synchronize from Db	Click here to obtain the stored procedure from the physical database.
Synchronize to Db	Click here to synchronize this stored procedure immediately to the physical database.

Business rules written on this layer are documented and are readily accessible as web services via standard database operations (Add, Update, Delete) by other applications.

Server Rule Listing

Command: Systems -> Server Rule Listing

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Business Rule Listing for Administration System

Order	Rule Type			Table Applied	Business Rule Name
Before	Add	Upd	Del	Procedure Name	Description

Screen: Culture Type Code
100	Constraints			Adm - Culture Type Code Table	One and Only One Default Check
N	Y	Y	N	CrOneCultureDefaultOnly	

Total Screen Count: 1

Screen: Custom Code
100	Inference			Adm - Custom Code	Initialize Custom Code
N	Y	Y	N	Ir_InitCustom	Initialize Custom Code description

Total Screen Count: 1

Screen: Custom Content
50	Constraints			Adm - Custom Code Detail	Check language code, path format, etc.
N	Y	Y	N	Cr_ChkCustomDtl	Check language code, path format, etc.
100	Inference			Adm - Custom Code Detail	Update description, etc.
N	Y	Y	N	Ir_UpdCustomDtl	Update description, etc.

Total Screen Count: 2

Screen: Data Table and Columns
10	Constraints			Adm - Data Table Characteristic	Check Duplicate Table Name
Y	Y	Y	N	Cr_ChkDupTblByName	Ensure unique table names are referenced
20	Constraints			Adm - Data Table Characteristic	Check Primary Keys
N	Y	Y	N	Cr_ChkPrimaryKey	Make sure there is one and only one primary key column.
30	Constraints			Adm - Data Table Columns	Prevent keywords being used as column name
N	Y	Y	N	Cr_ChkDbColumn	Prevent keywords being used as column name
40	Constraints			Adm - Data Table Columns	Prevent column from being deleted when referenced
Y	N	N	Y	Cr_DelDbColumn	Do not delete if referenced by screen, etc.
50	Inference			Adm - Data Table Characteristic	Update Data Column Description by table change
N	Y	Y	N	Ir_UpdDbColumn	Update data column Description by table change
60	Inference			Adm - Data Table Columns	Update Data Column information by column change
Y	N	Y	N	Ir_UpdColByCol	Update Data Column information by column change

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Web Rule Setup

The Web Rule Setup feature is one of the most dynamic rule layers. Developer may choose to define a rule to affect data, user interface or workflow, offering a nearly limitless range of functionality.   Here the user can call web services from other systems. Developers may code rules in this layer using Microsoft C# language. The only caution is because it is coded in C# and sometimes developer may code framework dependent code that may not execute properly upon update of operating system or dot net framework. When one of the following available events occurs, the user-defined business rules defined on this layer will be executed upon post-back to the web server. See qualifying events below:

Available Events

Event*:

Button Click (after)
Button Click (before)
Button Click (Replace)
Custom Function/Procedure
Default Value (Folder)
Default Value (Grid)
Delete Grid Row (before)
Delete Grid Row (Replace)
End of List Selection
End of Page Load
GridItemDataBound (after)
GridItemDataBound (before)
GridItemDataBound (Replace)
On Change

of Use | P
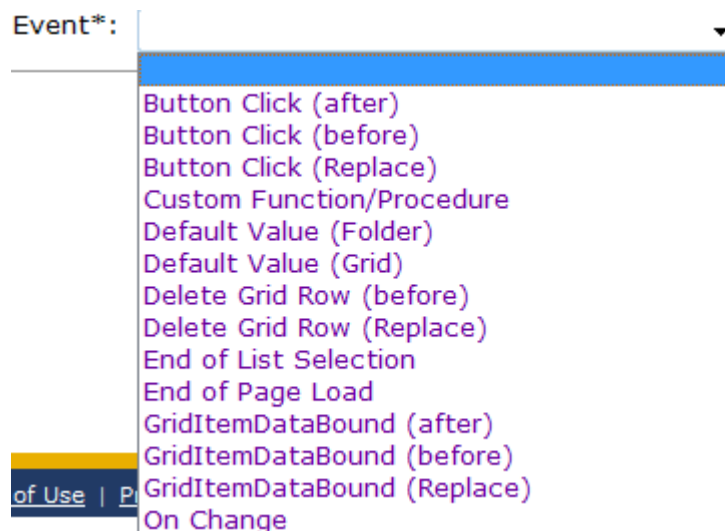
Event	Description
Button Click (after)	The ascx.cs program will initiate code written for this event after any Rintagi-generated code associated with this button is executed.
Button Click (before)	The ascx.cs program will initiate code written for this event before any Rintagi-generated code associated with this button is executed.
Button Click (replace)	The ascx.cs program will initiate code written for this event replacing any Rintagi-generated code associated with this button is executed.
Custom Function/Procedure	This written code is expected to be a well-formed function or procedure in C# code. It will initialize as an independent method inside the corresponding ascx.cs.
Default Value (Folder)	This written code will be generated to the end of the method called ClearMaster (which is called to set all the default values for all the columns of a new record on the tab folder).
Default Value (Grid)	This written code will be generated to the end of the method called Grid_AddNew (which is called to set all the default values for all the columns of a new grid row).
Delete Grid Row (before)	This written code will be executed before any Rintagi-generated code when a grid row is deleted.
Delete Grid Row (replace)	This written code will be executed instead of the Rintagi-generated code when a grid row is deleted.
End of List Selection	This written code will be executed after any Rintagi-generated code when one or more records are selected.
End of Page Load	This written code will be executed after all Rintagi-generated code is executed but before the page is fully loaded.
GridItemDataBound (after)	This event is executed in the middle of loading a data grid. The written code will be executed at the end of this event.
GridItemDataBound (before)	This written code will be executed before this data grid-loading event.
GridItemDataBound (replace)	This written code will replace all Rintagi-generated code in this event.

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On Change	Most often used event applies to all screen columns:
On Change (con't.)	- For dropdown, list-box, combo-box and radio-button column. This written code to be executed before Rintagi-generated code within a SelectedIndexChanged event. - For checkbox. This written code to be executed before Rintagi-generated code within a CheckedChanged event. - For calendar. This written code to be executed before Rintagi-generated code within a SelectionChanged event. - For button and image-button. This written code to be executed before Rintagi-generated code within a Clicked event. - For other types of columns. This written code to be executed before Rintagi-generated code within a TextChanged event.

Web Rule: Tab #1

Command: Rule Tier -> Web Rule

Web Rule: Tab #2

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Schema Characteristic	Description
Rule Name	The unique name for this web rule (100 characters or less).
Description	The detailed description for this web rule.
Rule Type	The rule type (constraint, computation, inference or action enabler) for this web rule.
Screen	The screen to apply this web rule to.
Screen Criteria	The screen criteria to apply this web rule, if applicable.
Screen Column	The screen column to apply this web rule, if applicable.
Screen Button	The screen button to apply this web rule, if applicable.
Event	The event to fire this web rule as listed above.
Rule to Apply	The well-tested rule to be generated onto the program.

Business rules on this layer will be generated to the modules/*.ascx.cs in the web tier as shown below:
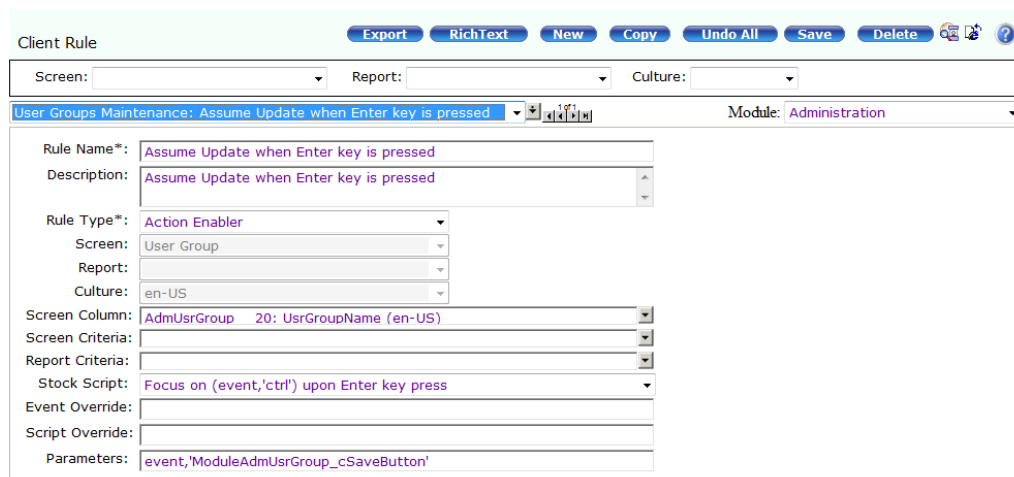
```
        private void cAdmScreenGrid_AddNew(DataView dvAdmScreenGrid)
        {
            DataRowView drv = dvAdmScreenGrid.AddNew();
            //WebRule: Get Default Culture for Screen Title
            drv["CultureId16"] = (new WebRule()).WrGetDefCulture(true);
            // *** WebRule End *** //
            if (dvAdmScreenGrid.Table.Columns.Contains("_SortOrder")) {int ii = int.Parse((string)Sessi
        }
```

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Client Rule Setup

The Client Rule Setup is used most often to define constraint rules such as "Input Mask", "User "Interface" or "Workflow". Although stock rules are readily available, developer may code custom rules in this layer using JavaScript language. There is no post-back when firing these rules. Code generation is not required for any changes made to these client rules and the result is immediate and dynamic.

Client Rule

Command: Rule Tier -> Client Rule

Schema Characteristic	Description
Rule Name	The unique name for the client rule (100 characters or less).
Description	The detailed description for this client rule.
Rule Type	The rule type (constraint, computation, inference or action enabler) for this client rule.
Screen	The screen to apply this client rule to, if applicable.
Report	The report that this client side rule applies, if applicable.
Culture	Applies only when the logon user is using this culture.
Screen Column	The screen column this client rule applies to, if applicable.
Screen Criteria	The screen criteria to apply this client rule to, if applicable.
Report Criteria	The report criteria to apply this client rule to, if applicable.
Stock Script	The stock script to apply, if applicable.
Event Override	This shall override the default event of the stock script, if applicable.
Script Override	Overrides the stock script. Use () only for function that has parameters. (Must end with ";", if applicable.) This function should already be tested and declared in UserRule.js.
Parameters	Identifies the column by the "@" sign followed by the ScreenObjId, ScreenCriId or ReportCriId separated by comma, if applicable. Alternatively this can be any ClientID on the page that is enclosed by single quotes.

Message Center Maintenance

Errors can be trapped on three distinct tiers:

1. Client tier: Achieved via Client Rule from above. An error message will be prompted before the data reaches the web tier.

2. Web tier: Errors are trapped based on the strongly-typed data and input masks that are defined when defining the screen columns. An error message will be prompted before data reaches the data tier.

3. Data tier: Errors are trapped when data reaches the database.

While creating the stored procedure for a server rule, there are two ways to create an error message to be displayed when needed. One method is to code it directly within the stored procedure (in English). This message may not be accessible to other business rules, however.

The other method defines an error message in the "Message Center," where various human translations for the message are available automatically, and can be referenced by numerous stored procedures.

Message Center

In order to reference this error message the user must enclose the Message ID (numeric) within curly brackets. For example "{1}" references the error message whose ID is "1" within the database. When defining the message, use {%S}…{%S}…{%D} to refer to first parameter, second parameter, etc. Use the convention "S" for string, "D" for numeric without decimal, etc. However, the positioning digit when referencing this error message is not necessary.

Server Rule


```
Server Rule                    Export   RichText   New   Copy   Undo All   Save   Delete

Screen: Column Authority Default

Default Column Authority 100: One and Only One Default Check              Module: Administration

Main Info | Content

S.Procedure:  CREATE PROCEDURE CrOneAuthDefaultOnly
              /* WITH ENCRYPTION */
              AS
              SET NOCOUNT ON
              DECLARE  @AuthDesc        varchar(50)
              IF (SELECT count('true') FROM dbo.CtColAuthority WHERE AuthDefault = 'Y') <> 1
              BEGIN
                      SELECT @AuthDesc = ColAuthorityDesc FROM dbo.CtColAuthority WHERE AuthDefault = 'Y'
                      RAISERROR('{1}{%s}',18,2,@AuthDesc) WITH SETERROR
                      RETURN 1
              END
              RETURN 0

Modified By: Nelson Lin         On: 2/10/2007 5:06:40 PM  Last Generated: 2/10/2007 5:06:40 PM
```

Language Translation

Rintagi generated enterprise applications are multilingual. Once the application is built in English then labels, tool tips, messages, etc. in many other human languages can be automatically generated with Rintagi. Human translators may inspect and change to preferred phrases and wordings without involving technical staff. For those languages not provided automatically, translation into any Unicode supported language can be accomplished via Rintagi's user-friendly interface.

Each human language can be translated within minutes by the press of a button.

Translator Screen

Culture Description*		Delete A
U.S. English		
French		
German		Delete
Mainland Chinese		Delete
Mexican Spanish		Delete
Russian	Cancel	Delete
U.K. English		Delete

Click here to translate all not-yet-translated items from default culture to this culture. This could take more than a few minutes.

If the above translation is not satisfactory, built-in screens provide editing capability for each individual translation.

Translation Editing

Culture*	Column Header	Width	Error Message	Tool Tips
U.S. English	Program Name	110	Please enter a unique User Program Name 20 characters or less.	This is the unique Program Name for this screen 20 characters or less.
French	Nom de programme	110	Veuillez entrer dans les caractères uniques ou moins d'un nom 20 de programme utilisateur.	C'est les caractères uniques ou moins du nom 20 de programme.
Mainland Chinese	节目名称	110	请用户进入一个独特的节目名称或少于20个字.	这20个字是独一无二节目名称或更少.

Each user is designated one or more user-defined user groups and a specific human language with a country-specific locale. Although each user may belong to many user groups, he/she may only choose one human language at a time.

User Management

Human language in Rintagi is identified by culture. Each culture code is made up of 2 letter language codes (lower case) derived from the ISO 639 standard, followed by a hyphen, then a country codes (upper case) from ISO 3166. For example, "en-US" represents United States English while "en-UK" represents United Kingdom English. Aside from differences in expression, the country code also determines date and numeric formats, as well as currency representation.

Two Letter Language Codes

```
aa Afar                          af Afrikaans
ab Abkhazian                     am Amharic
```

```
ar Arabic                              it Italian
as Assamese                            iu Inuktitut
ay Aymara
az Azerbaijani                         ja Japanese
                                       jw Javanese
ba Bashkir
be Byelorussian                        ka Georgian
bg Bulgarian                           kk Kazakh
bh Bihari                              kl Greenlandic
bi Bislama                             km Cambodian
bn Bengali; Bangla                     kn Kannada
bo Tibetan                             ko Korean
br Breton                              ks Kashmiri
                                       ku Kurdish
ca Catalan                             ky Kirghiz
co Corsican
cs Czech                               la Latin
cy Welsh                               ln Lingala
                                       lo Laothian
da Danish                              lt Lithuanian
de German                              lv Latvian, Lettish
dz Bhutani
                                       mg Malagasy
el Greek                               mi Maori
en English                             mk Macedonian
eo Esperanto                           ml Malayalam
es Spanish                             mn Mongolian
et Estonian                            mo Moldavian
eu Basque                              mr Marathi
                                       ms Malay
fa Persian                             mt Maltese
fi Finnish                             my Burmese
fj Fiji
fo Faroese                             na Nauru
fr French                              ne Nepali
fy Frisian                             nl Dutch
                                       no Norwegian
ga Irish
gd Scots Gaelic                        oc Occitan
gl Galician                            om (Afan) Oromo
gn Guarani                             or Oriya
gu Gujarati
                                       pa Punjabi
ha Hausa                               pl Polish
he Hebrew (formerly iw)                ps Pashto, Pushto
hi Hindi                               pt Portuguese
hr Croatian
hu Hungarian                           qu Quechua
hy Armenian
                                       rm Rhaeto-Romance
ia Interlingua                         rn Kirundi
id Indonesian (formerly in)            ro Romanian
ie Interlingue                         ru Russian
ik Inupiak                             rw Kinyarwanda
is Icelandic
```

```
sa Sanskrit                         tn Setswana
sd Sindhi                           to Tonga
sg Sangho                           tr Turkish
sh Serbo-Croatian                   ts Tsonga
si Sinhalese                        tt Tatar
sk Slovak                           tw Twi
sl Slovenian
sm Samoan                           ug Uighur
sn Shona                            uk Ukrainian
so Somali                           ur Urdu
sq Albanian                         uz Uzbek
sr Serbian
ss Siswati                          vi Vietnamese
st Sesotho                          vo Volapuk
su Sundanese
sv Swedish                          wo Wolof
sw Swahili
                                    xh Xhosa
ta Tamil
te Telugu                           yi Yiddish (formerly ji)
tg Tajik                            yo Yoruba
th Thai
ti Tigrinya                         za Zhuang
tk Turkmen                          zh Chinese
tl Tagalog                          zu Zulu
```

Two Letter Country Codes

The available country codes are:

```
Country                             A 2     A 3     Number
----------------------------------------------------------------

AFGHANISTAN                         AF      AFG     004
ALAND ISLANDS                       AX      ALA     248
ALBANIA                             AL      ALB     008
ALGERIA                             DZ      DZA     012
AMERICAN SAMOA                      AS      ASM     016
ANDORRA                             AD      AND     020
ANGOLA                              AO      AGO     024
ANGUILLA                            AI      AIA     660
ANTARCTICA                          AQ      ATA     010
ANTIGUA AND BARBUDA                 AG      ATG     028
ARGENTINA                           AR      ARG     032
ARMENIA                             AM      ARM     051
ARUBA                               AW      ABW     533
AUSTRALIA                           AU      AUS     036
AUSTRIA                             AT      AUT     040
AZERBAIJAN                          AZ      AZE     031
BAHAMAS                             BS      BHS     044
BAHRAIN                             BH      BHR     048
BANGLADESH                          BD      BGD     050
BARBADOS                            BB      BRB     052
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BELARUS	BY	BLR	112
BELGIUM	BE	BEL	056
BELIZE	BZ	BLZ	084
BENIN	BJ	BEN	204
BERMUDA	BM	BMU	060
BHUTAN	BT	BTN	064
BOLIVIA	BO	BOL	068
BOSNIA AND HERZEGOVINA	BA	BIH	070
BOTSWANA	BW	BWA	072
BOUVET ISLAND	BV	BVT	074
BRAZIL	BR	BRA	076
BRITISH INDIAN OCEAN TERRITORY	IO	IOT	086
BRUNEI DARUSSALAM	BN	BRN	096
BULGARIA	BG	BGR	100
BURKINA FASO	BF	BFA	854
BURUNDI	BI	BDI	108
CAMBODIA	KH	KHM	116
CAMEROON	CM	CMR	120
CANADA	CA	CAN	124
CAPE VERDE	CV	CPV	132
CAYMAN ISLANDS	KY	CYM	136
CENTRAL AFRICAN REPUBLIC	CF	CAF	140
CHAD	TD	TCD	148
CHILE	CL	CHL	152
CHINA	CN	CHN	156
CHRISTMAS ISLAND	CX	CXR	162
COCOS (KEELING) ISLANDS	CC	CCK	166
COLOMBIA	CO	COL	170
COMOROS	KM	COM	174
CONGO	CG	COG	178
CONGO, THE DEMOCRATIC REPUBLIC OF THE	CD	COD	180
COOK ISLANDS	CK	COK	184
COSTA RICA	CR	CRI	188
COTE D'IVOIRE	CI	CIV	384
CROATIA	HR	HRV	191
CUBA	CU	CUB	192
CYPRUS	CY	CYP	196
CZECH REPUBLIC	CZ	CZE	203
DENMARK	DK	DNK	208
DJIBOUTI	DJ	DJI	262
DOMINICA	DM	DMA	212
DOMINICAN REPUBLIC	DO	DOM	214
ECUADOR	EC	ECU	218
EGYPT	EG	EGY	818
EL SALVADOR	SV	SLV	222
EQUATORIAL GUINEA	GQ	GNQ	226
ERITREA	ER	ERI	232
ESTONIA	EE	EST	233
ETHIOPIA	ET	ETH	231
FALKLAND ISLANDS (MALVINAS)	FK	FLK	238
FAROE ISLANDS	FO	FRO	234
FIJI	FJ	FJI	242
FINLAND	FI	FIN	246
FRANCE	FR	FRA	250
FRENCH GUIANA	GF	GUF	254
FRENCH POLYNESIA	PF	PYF	258
FRENCH SOUTHERN TERRITORIES	TF	ATF	260
GABON	GA	GAB	266
GAMBIA	GM	GMB	270
GEORGIA	GE	GEO	268
GERMANY	DE	DEU	276

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GHANA	GH	GHA	288
GIBRALTAR	GI	GIB	292
GREECE	GR	GRC	300
GREENLAND	GL	GRL	304
GRENADA	GD	GRD	308
GUADELOUPE	GP	GLP	312
GUAM	GU	GUM	316
GUATEMALA	GT	GTM	320
GUERNSEY	GG	GGY	831
GUINEA	GN	GIN	324
GUINEA-BISSAU	GW	GNB	624
GUYANA	GY	GUY	328
HAITI	HT	HTI	332
HEARD ISLAND AND MCDONALD ISLANDS	HM	HMD	334
HOLY SEE (VATICAN CITY STATE)	VA	VAT	336
HONDURAS	HN	HND	340
HONG KONG	HK	HKG	344
HUNGARY	HU	HUN	348
ICELAND	IS	ISL	352
INDIA	IN	IND	356
INDONESIA	ID	IDN	360
IRAN (ISLAMIC REPUBLIC OF)	IR	IRN	364
IRAQ	IQ	IRQ	368
IRELAND	IE	IRL	372
ISLE OF MAN	IM	IMM	833
ISRAEL	IL	ISR	376
ITALY	IT	ITA	380
JAMAICA	JM	JAM	388
JAPAN	JP	JPN	392
JERSEY	JE	JEY	832
JORDAN	JO	JOR	400
KAZAKHSTAN	KZ	KAZ	398
KENYA	KE	KEN	404
KIRIBATI	KI	KIR	296
KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF	KP	PRK	408
KOREA, REPUBLIC OF	KR	KOR	410
KUWAIT	KW	KWT	414
KYRGYZSTAN	KG	KGZ	417
LAO PEOPLE'S DEMOCRATIC REPUBLIC	LA	LAO	418
LATVIA	LV	LVA	428
LEBANON	LB	LBN	422
LESOTHO	LS	LSO	426
LIBERIA	LR	LBR	430
LIBYAN ARAB JAMAHIRIYA	LY	LBY	434
LIECHTENSTEIN	LI	LIE	438
LITHUANIA	LT	LTU	440
LUXEMBOURG	LU	LUX	442
MACAO	MO	MAC	446
MACEDONIA, THE FORMER YUGOSLAV REPUBLIC OF	MK	MKD	807
MADAGASCAR	MG	MDG	450
MALAWI	MW	MWI	454
MALAYSIA	MY	MYS	458
MALDIVES	MV	MDV	462
MALI	ML	MLI	466
MALTA	MT	MLT	470
MARSHALL ISLANDS	MH	MHL	584
MARTINIQUE	MQ	MTQ	474
MAURITANIA	MR	MRT	478
MAURITIUS	MU	MUS	480
MAYOTTE	YT	MYT	175
MEXICO	MX	MEX	484

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MICRONESIA, FEDERATED STATES OF            FM      FSM      583
MOLDOVA, REPUBLIC OF                        MD      MDA      498
MONACO                                      MC      MCO      492
MONGOLIA                                    MN      MNG      496
MONTENEGRO                                  ME      MNE      499
MONGOLIA                                    MN      MNG      496
MONTSERRAT                                  MS      MSR      500
MOROCCO                                     MA      MAR      504
MOZAMBIQUE                                  MZ      MOZ      508
MYANMAR                                     MM      MMR      104
NAMIBIA                                     NA      NAM      516
NAURU                                       NR      NRU      520
NEPAL                                       NP      NPL      524
NETHERLANDS                                 NL      NLD      528
NETHERLANDS ANTILLES                        AN      ANT      530
NEW CALEDONIA                               NC      NCL      540
NEW ZEALAND                                 NZ      NZL      554
NICARAGUA                                   NI      NIC      558
NIGER                                       NE      NER      562
NIGERIA                                     NG      NGA      566
NIUE                                        NU      NIU      570
NORFOLK ISLAND                              NF      NFK      574
NORTHERN MARIANA ISLANDS                    MP      MNP      580
NORWAY                                      NO      NOR      578
OMAN                                        OM      OMN      512
PAKISTAN                                    PK      PAK      586
PALAU                                       PW      PLW      585
PALESTINIAN TERRITORY, OCCUPIED             PS      PSE      275
PANAMA                                      PA      PAN      591
PAPUA NEW GUINEA                            PG      PNG      598
PARAGUAY                                    PY      PRY      600
PERU                                        PE      PER      604
PHILIPPINES                                 PH      PHL      608
PITCAIRN                                    PN      PCN      612
POLAND                                      PL      POL      616
PORTUGAL                                    PT      PRT      620
PUERTO RICO                                 PR      PRI      630
QATAR                                       QA      QAT      634
REUNION                                     RE      REU      638
ROMANIA                                     RO      ROU      642
RUSSIAN FEDERATION                          RU      RUS      643
RWANDA                                      RW      RWA      646
SAINT HELENA                                SH      SHN      659
SAINT KITTS AND NEVIS                       KN      KNA      659
SAINT LUCIA                                 LC      LCA      662
SAINT PIERRE AND MIQUELON                   PM      SPM      666
SAINT VINCENT AND THE GRENADINES            VC      VCT      670
SAMOA                                       WS      WSM      882
SAN MARINO                                  SM      SMR      674
SAO TOME AND PRINCIPE                       ST      STP      678
SAUDI ARABIA                                SA      SAU      682
SENEGAL                                     SN      SEN      686
SERBIA                                      RS      SRB      688
SEYCHELLES                                  SC      SYC      690
SIERRA LEONE                                SL      SLE      694
SINGAPORE                                   SG      SGP      702
SLOVAKIA                                    SK      SVK      703
SLOVENIA                                    SI      SVN      705
SOLOMON ISLANDS                             SB      SLB      090
SOMALIA                                     SO      SOM      706
SOUTH AFRICA                                ZA      ZAF      710
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SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS    GS      SGS     239
SPAIN                                           ES      ESP     724
SRI LANKA                                       LK      LKA     144
SUDAN                                           SD      SDN     736
SURINAME                                        SR      SUR     740
SVALBARD AND JAN MAYEN                          SJ      SJM     744
ST. HELENA                                      SH      SHN     654
ST. PIERRE AND MIQUELON                         PM      SPM     666
SWAZILAND                                       SZ      SWZ     748
SWEDEN                                          SE      SWE     752
SWITZERLAND                                     CH      CHE     756
SYRIAN ARAB REPUBLIC                            SY      SYR     760
TAIWAN, PROVINCE OF CHINA                       TW      TWN     158
TAJIKISTAN                                      TJ      TJK     762
TANZANIA, UNITED REPUBLIC OF                    TZ      TZA     834
THAILAND                                        TH      THA     764
TIMOR-LESTE                                     TL      TLS     626
TOGO                                            TG      TGO     768
TOKELAU                                         TK      TKL     772
TONGA                                           TO      TON     776
TRINIDAD AND TOBAGO                             TT      TTO     780
TUNISIA                                         TN      TUN     788
TURKEY                                          TR      TUR     792
TURKMENISTAN                                    TM      TKM     795
TURKS AND CAICOS ISLANDS                        TC      TCA     796
TUVALU                                          TV      TUV     798
UGANDA                                          UG      UGA     800
UKRAINE                                         UA      UKR     804
UNITED ARAB EMIRATES                            AE      ARE     784
UNITED KINGDOM                                  GB      GBR     826
UNITED STATES                                   US      USA     840
UNITED STATES MINOR OUTLYING ISLANDS            UM      UMI     581
URUGUAY                                         UY      URY     858
UZBEKISTAN                                      UZ      UZB     860
VANUATU                                         VU      VUT     548
VATICAN CITY STATE (HOLY SEE)                   VA      VAT     336
VENEZUELA                                       VE      VEN     862
VIET NAM                                        VN      VNM     704
VIRGIN ISLANDS (BRITISH)                        VG      VGB     092
VIRGIN ISLANDS (U.S.)                           VI      VIR     850
WALLIS AND FUTUNA                               WF      WLF     876
WESTERN SAHARA                                  EH      ESH     732
YEMEN                                           YE      YEM     887
YUGOSLAVIA                                      YU      YUG     891
ZAMBIA                                          ZM      ZMB     894
ZIMBABWE                                        ZW      ZWE     716
```
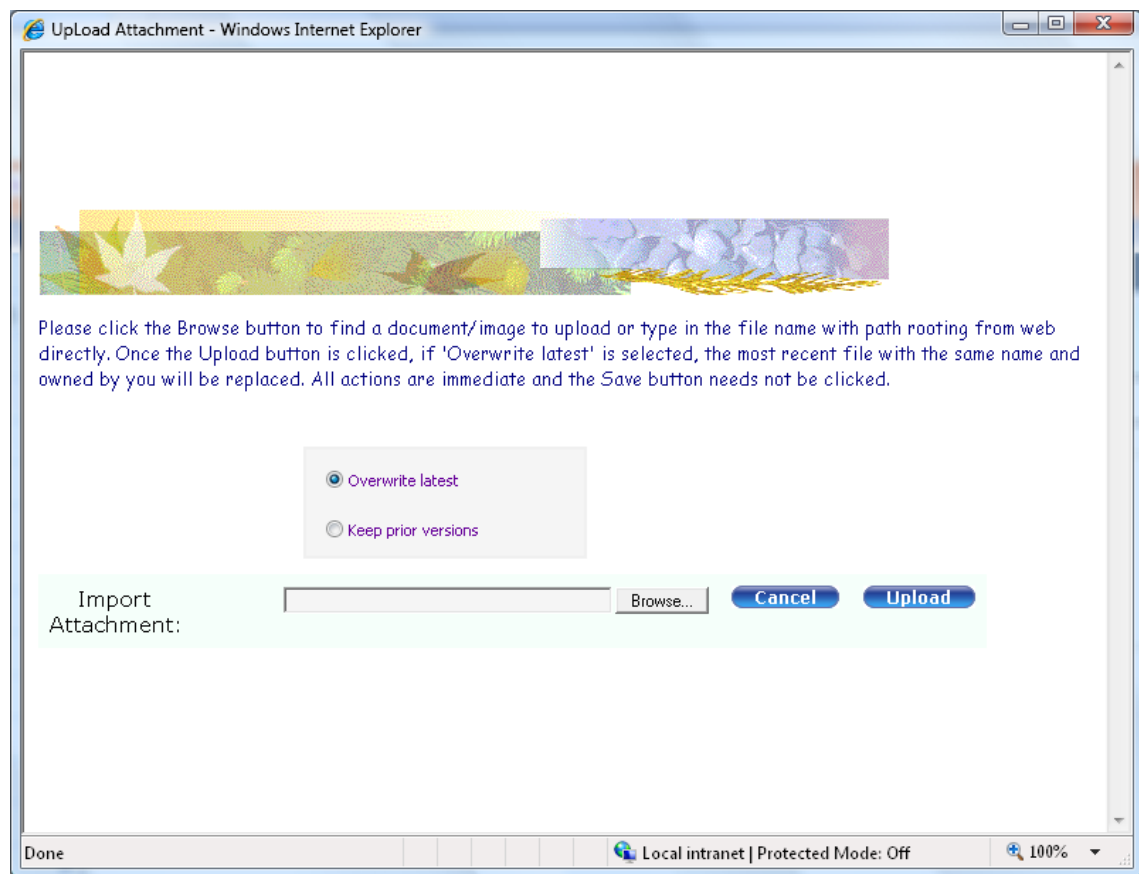
Document Imaging

Document imaging cannot be easier because it is a built-in feature for Rintagi generated enterprise applications. It has been tested that on average it would only a second to add this capability to attach to any column or entity. The user-friendly interface Rintagi generated allows users to add unlimited number of pictures, images and documents of any types with version management capability. Each user only may also delete his/ her imported pictures, images and documents.

Below is a sample of the user interface.

Document Imaging
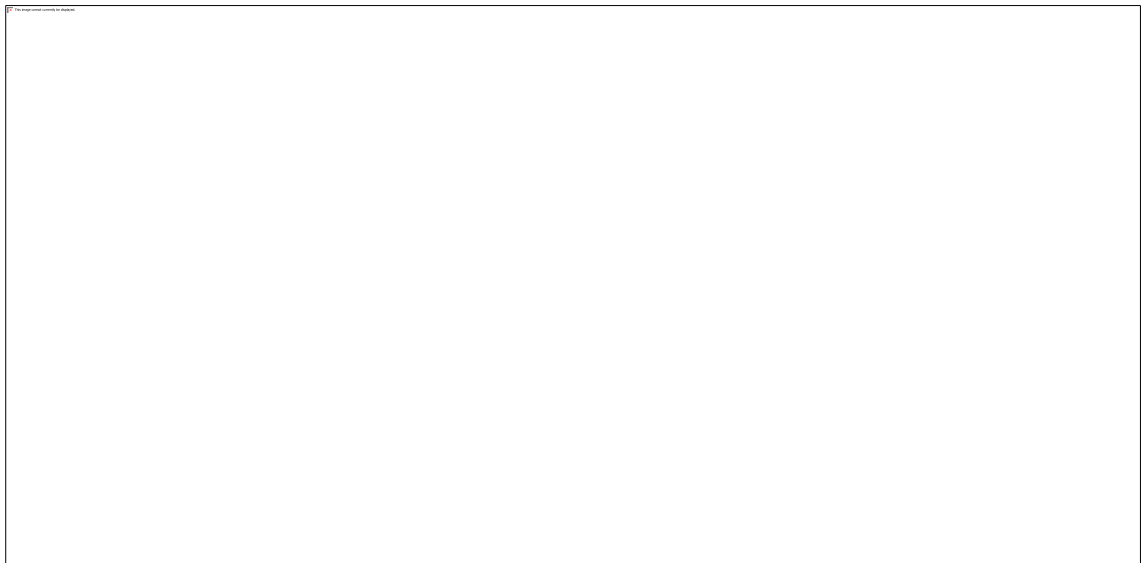
Click the icon on the left and you would be able to import any picture, image or document of your choice as follow:

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Although this feature is currently not available to DataGrid, to make all of these happen, the followings need to be done as a developer:

1. In the table you wish to attach these document images, add a column as a null-able integer;

2. In Screen Column Characteristic select "Document"

3. A table with the same name as the above column is added automatically as depository for all the document images with the following structures:

```
        DocId int IDENTITY(1,1) NOT NULL,
        MasterId int NOT NULL,
        DocName nvarchar(100) NOT NULL,
        MimeType varchar(100) NOT NULL,
        DocSize bigint NOT NULL,
        DocImage varbinary(max) NOT NULL,
        InputBy int NULL,
        InputOn datetime NULL,
        Active char(1) NOT NULL,
  CONSTRAINT PK_BillDoc PRIMARY KEY CLUSTERED
```

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4. In Screen Column Properties, for the additional column defined in #1 above, specify the following:

- Width: 500px (typical width of a imaging grd);
- Height: 2 (number of documents per page displayed);
- Display Mode: Select Document
- Dropdown Key: ??Doc – DocId (automatic)
- Dropdown Ref: ??Doc – DocName (automatic)

??Doc is the depository table designated for the storage of these documents for this screen column.

5. A virtual foreign key linking the additional column defined in #1 above with ??Doc – DocId is added automatically;

6. The screen is automatically regenerated when accessed, compiled and it's done.