

# Automatic Generation of SAP Business One Forms



## Applies to:

SAP Business One / SAP Business One SDK. For more information, visit the [Business One homepage](#).

## Summary

This article shows some advanced techniques to automatically generate SAP Business One forms, based on the XML Forms format. Some code samples are also provided.

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## Introduction

Integration with SAP Business One GUI implies usually the design of several forms and their association to menu items. Every form is composed of a layout – several items of different type with a well defined geometry – and of several data bindings of these items together with tables and columns in the B1 DB.

Forms can be defined following two main methods.

The first method is to use the SDK methods to add a form in the collections of the B1 forms and to add in this form all the items one by one. This is done using the `Application.Forms` and the `Form.Items` collections. Usually this technique is appropriate only for very small forms: it requires many methods calls and then introduces a performance degradation caused by all the implicit inter-process communications. Remember: add-ons reside in another address spaces than SAP Business One client.

The second method is to use the XML format for SAP Business One forms. By using the `LoadBatchActions` it is possible to batch all the above calls in a single declarative format and then move all the construction of the form inside SAP Business One client.

This second method anyway is then interesting not only for the performance improvement it introduces, but also because of the declarative way to build a form – as opposed to the first programmatic way. This declarative approach is implemented using a standard format as XML that can be built or parsed with standard and available off-the-shelf methods.

This article will then describe two samples on how to automatically build forms using this XML format. The two cases here are examples of what can be done based on the powerful XML representation of a SAP Business One form and go with some code sample.

These samples are in Microsoft Visual Studio .NET C# and use the namespace `System.Xml` to browse and build XML files.

Of course it is possible to invent and implement other meaningful cases depending on the solution needs and development and target environment.

## Building a form from a UDO

In the first case the XML file describing a SAP Business One form is built starting from a User Defined Object. This technique can be useful to generate data-driven solutions.

This code is implemented in the B1 Development Environment (B1DE) available in SDN as part of the SAP Business One UDO Form Generator in the source file `Xm1FormGenerator.cs`.

This code just create an XML Form file by reading the UDO, tables and columns definitions related to a UDO in the SAP Business One database. All these metadata are read using SAP Business One DI API metadata objects, while the creation of the XML file is implemented by using the standard `.NET System.Xml` namespace.

Let's have a look on how this form is created by taking as a sample a UDO called `SAP_TS` of type master data, residing in a master table `@SAP_MT` and 2 children tables `@SAP_TSML` and `@SAP_TSML2`. The generated XML file is in the appendix.

First the form section attributes are created, with the dimension of a standard form and the object type set to the UDO. Then all the tables are put in the DB data source section.

```
<Application>
  <forms>
    <action type="add">
      <form AutoManaged="0" BorderStyle="0" FormType="SAP_TS"
Object Type="SAP_TS" SupportedModes="15"
appformnumber="SAP_TS" client_height="373" client_width="518"
color="0" default_button="1" height="373" left="219" mode="0"
pane="0" title="SAP_TS" top="95" type="0" uid="SAP_TS"
visible="1" width="518">
        <datasources>
          <dbdatasources>
            <action type="add">
              <datasource tablename="@SAP_MD" />
              <datasource tablename="@SAP_TSML" />
              <datasource tablename="@SAP_TSML2" />
            </action>
          </dbdatasources>
          <userdatasources>
            <action type="add">
              <datasource size="9" type="1" uid="FolderDS" />
            </action>
          </userdatasources>
        </datasources>
      </form>
    </action>
  </forms>
</Application>
```

As there are child tables, a user data source `FolderDS` is added. Then items are added in the form as element below the items node.

```
<items>
  <action type="add">
    <item uid= ... >
  </item>
</action>
</items>
```

First buttons should be added: one button for Add/Update/Find and one button for Cancel with the standard ids 1 and 2. If the UDO has child tables, then also a button to add lines and a button to delete lines are added.

Then for every column discovered in the master table, two items are added in the header part of the form: a static text containing the name of the column linked to an item visualizing the content of the records in the column. This item is bound to the corresponding column and can be a text field, a check box or a combo box according to the following simple rules.

If the column has no default values, then it will be visualized as a text field.

If it has Yes/No default values, it will be visualized as a check box.

Otherwise in case of more default values, it will be visualized as a combo box.

Here's the generic XML snippet for these couple of items, where the first item section specifies the item and the second one the static text linked to the item itself.

```
<item AffectsFormMode="1" ... >
  <AutoManagedAttribute />
  <specific>
    <databind alias= ... />
  </specific>
</item>
<item AffectsFormMode="1" ... >
  <specific caption= ... />
</item>
```

Then for every child table in the UDO, a folder is added. This folder will contain a matrix with a column for every column in the table itself. These columns have type as above and are bound to the corresponding column in the table.

The folders are grouped together and bound to the user data source FolderDS. The fromPane and toPane attributes are set per each matrix in order to link them to the corresponding folder.

Finally the DataBrowser element is set to the item bound to the primary key. In this case Code, that is item number 3 because: 0 and 1 are the standard buttons, 2 is the related static text and 3 is the text field containing the primary key value.

```
<items>
  <action type="group">
    <item uid="tab_0" />
    <item uid="tab_1" />
  </action>
</items>
<DataBrowser BrowseBy="3" />
</form>
```

In this way we have automatically built a form starting from a UDO definition. Note that we didn't only create a layout but also we bound it to data in the DB. That means that – driven by standard navigation buttons – the form will get populated automatically during navigation and will enable full handling of the underlying UDO records in terms of creation, deletion and update.

The only support code needed is the code to handle the folders and the code to handles the buttons to add or remove lines in the matrixes. You can find this code in B1DE solution.

The next figure contains a screenshot of this sample form. Note that the code in B1DE can generate a suitable layout for all kinds of UDOs: MasterData, MasterDataLines, Document and DocumentLines. The generated forms are following SAP Business One SDK and look-and-feel guidelines.

The screenshot shows a window titled "SAP\_TS" with a header section containing the following fields:

- Code: [ ]
- Name: [ ]
- f1: [ ]
- f2:

Below the header is a table with two columns, "f1" and "f2", and a header row starting with "#". The table is currently empty. A mouse cursor is visible over the table area.

At the bottom of the form are four buttons: "Find", "Cancel", "Add line", and "Del line".

## Building a form from a Windows .NET Form

In the second case an XML file describing a SAP Business One form is built starting from a Windows .NET form, i.e. an instance of a `System.Windows.Forms.Form` class. This technique can be useful to quickly move a .NET GUI in SAP Business One technology.

The generic form translation code is in the source file implemented in `NetFormTranslator`. The classes `FormSample` and `FormSample_simple` are just test forms.

This code just creates an XML Form file by navigating the control structure of a Windows .NET form based on the recursive control containment relationship. The creation of the XML file is implemented by using the standard .NET `System.Xml` namespace.

Recursion is needed because some controls can be contained by others and then not discoverable at the first level: for instance a button in a tab control.

Once an item is found it is translated in an `<item>` snippet of the `<items>` section of the XML form. The translation is done according to very simple rules:

The geometry of the form is maintained, maintaining dimensions and positions of the controls in the form. That means that the item attributes `height`, `left`, `top`, and `width` are taken from the geometry data of the control. Note that there is no containment relationship in SAP Business One forms: so that requires some bias calculations because the left and top of a Windows control are relative to the parent control, while in a SAP Business One form they are related to the form itself.

Types are translated in a canonical way: controls of `System.Windows.Forms.Button` type are translated as UI API items of type `it_BUTTON`, and so on. The only special handling required here is for folders: again, as there is no containment relationship in SAP Business One forms, an item belongs to a folder if its pane level is coherent with the pane level of the folder itself. As in previous case, the support code to manage the folders can be found in B1DE solution (in class `B1FolderMgr`).

Data bindings are not taken into account in this sample. If the .NET form has some sort of data binding information, that can be navigated and translated accordingly.

The C#-code snippet below shows how to discover recursively the control in a form.

```
private void addControl(Control ctrl)
{
    /// no children
    if (ctrl.Controls == null)
        return;

    /// loop on children
    foreach (Control child in ctrl.Controls)
    {
        addItem(child);
        addControl(child);
    }
}
```

The method `addItem` here adds an `<item>` snippet to the `<items>` node, including the `<specific>` part. The navigation starts by calling `addControl` on the form itself.

A final note on guidelines: of course this process can lead to forms that do not follow the SAP Business One look-and-feel guidelines. You can use the B1TE Form Checker tool to find the issues and then correct them in the XML.

A direction of improvement for `NetFormTranslator` could be to generate forms that are compliant to (some of) the look-and-feel rules by making the translation rules clever and more advanced. For instance the dimensions of items can be adjusted; or a new layout can be recreated from scratch by mimicking as much as possible a standard form (as in the first example); and so on.

## Appendix

This is the XML file generated by the UDO Form Generator for the sample in the section 1.

```

<Application>
<forms>
  <action type="add">
    <form AutoManaged="0" BorderStyle="0" FormType="SAP_TS"
    ObjectType="SAP_TS" SupportedModes="15" appformnumber="SAP_TS"
    client_height="373" client_width="518" color="0"
    default_button="1" height="373" left="219" mode="0" pane="0"
    title="SAP_TS" top="95" type="0" uid="SAP_TS_" visible="1"
    width="518">

<datasources>
  <dbdatasources>
    <action type="add">
      <datasource tablename="@SAP_TSM" />
      <datasource tablename="@SAP_TSML" />
      <datasource tablename="@SAP_TSML2" />
    </action>
  </dbdatasources>

<userdatasources>
  <action type="add">
    <datasource size="9" type="1" uid="FolderDS" />
  </action>
</userdatasources>
</datasources>

<items>
  <action type="add">

    <item AffectsFormMode="1" bgcolor="-1" description=""
    disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
    right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
    uid="1" width="65" height="20" top="320" left="5" type="4" />

    <item AffectsFormMode="1" bgcolor="-1" description="" disp_desc="0" enabled="1"
    font_size="0" forecolor="-1" from_pane="0" linkto="" right_just="0" supp_zeros="0"
    tab_order="0" text_style="0" to_pane="0" visible="1" uid="2" width="65" height="20"
    top="320" left="75" type="4" />

    <item AffectsFormMode="1" bgcolor="-1" description="" disp_desc="0" enabled="1"
    font_size="0" forecolor="-1" from_pane="0" linkto="" right_just="0" supp_zeros="0"
    tab_order="0" text_style="0" to_pane="0" visible="1" uid="add" width="65" height="20"
    top="320" left="370" type="4">
      <specific caption="Add line" />
    </item>

    <item AffectsFormMode="1" bgcolor="-1" description=""
    disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
    right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
    uid="del" width="65" height="20" top="320" left="440" type="4">
      <specific caption="Del line" />
    </item>

```



```

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="3" width="80" height="14" top="5" left="92" type="16">
  <AutoManagedAttribute />
  <specific>
    <databind
alias="Code" databound="1" table="@SAP_TSM" />
  </specific>
</item>

```

```

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto="3"
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="4" width="80" height="14" top="5" left="5" type="8">
  <specific caption="Code" />
</item>

```

```

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="5" width="80" height="14" top="20" left="92" type="16">
  <AutoManagedAttribute />
  <specific>
    <databind
alias="Name" databound="1" table="@SAP_TSM" />
  </specific>
</item>

```

```

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto="5"
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="6" width="80" height="14" top="20" left="5" type="8">
  <specific caption="Name" />
</item>

```

```

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="7" width="80" height="14" top="35" left="92" type="16">
  <AutoManagedAttribute />
  <specific>
    <databind
alias="U_f1" databound="1" table="@SAP_TSM" />
  </specific>
</item>

```

```

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto="7"
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="8" width="80" height="14" top="35" left="5" type="8">
  <specific caption="f1" />
</item>

```

```

<item AffectsFormMode="1" bgcolor="-1" description=""

```

```

disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="9" width="80" height="14" top="50" left="92" type="121">
    <AutoManagedAttribute />
    <specific>
        <databind
alias="U_f2" databound="1" table="@SAP_TSM" />
        </specific>
    </item>

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto="9"
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="10" width="80" height="14" top="50" left="5" type="8">
    <specific caption="f2" />
</item>

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="11" width="80" height="14" top="5" left="271" type="16">
    <AutoManagedAttribute />
    <specific>
        <databind
alias="U_f3" databound="1" table="@SAP_TSM" />
        </specific>
    </item>

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto="11"
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="12" width="80" height="14" top="5" left="184" type="8">
    <specific caption="f3" />
</item>

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" from_pane="0" linkto=""
right_just="0" supp_zeros="0" tab_order="0" text_style="0" to_pane="0" visible="1"
uid="tab_0" width="120" height="19" top="90" left="5" type="99">
    <AutoManagedAttribute />
    <specific>
AffectsFormMode="0" caption="SAP_TSML"
val_off="0" val_on="1">
        <databind
alias="FolderDS" databound="1" table="" />
        </specific>
    </item>

<item AffectsFormMode="1" bgcolor="-1" description=""
disp_desc="0" enabled="1" font_size="0" forecolor="-1" linkto="" right_just="0"
supp_zeros="0" tab_order="0" text_style="0" visible="1" uid="rect_0" width="500"
height="165" top="108" left="5" type="100" to_pane="0" from_pane="0">
    <AutoManagedAttribute />
</item>

<item AffectsFormMode="1" bgcolor="-1" description=""

```

```

disp_desc="0" enabled="1" font_size="0" forecolor="-1" linkto="" right_just="0"
supp_zeros="0" tab_order="0" text_style="0" visible="1" uid="mtx_0" width="490"
height="155" top="113" left="10" type="127" to_pane="0" from_pane="0">
    <AutoManagedAttribute />
    <specific
SelectionMode="2" layout="0" titleHeight="20">
    <columns>
        <action type="add">

            <column AffectsFormMode="1" backcolor="-1"
description="" disp_desc="0" editable="1" font_size="12" forecolor="-1"
right_just="0" text_style="0" visible="1" val_off="" val_on="" title="#" uid="col_f"
width="20" type="16" />

<column AffectsFormMode="1" backcolor="-1" description="" disp_desc="0" editable="1"
font_size="12" forecolor="-1" right_just="0" text_style="0" visible="1" val_off=""
val_on="" title="f1" uid="col_0" width="225" type="16">
<databind alias="U_f1" databound="1" table="@SAP_TSML" />
    <ExtendedObject />
    </column>

<column AffectsFormMode="1" backcolor="-1" description="" disp_desc="0" editable="1"
font_size="12" forecolor="-1" right_just="0" text_style="0" visible="1" val_off=""
val_on="" title="f2" uid="col_1" width="225" type="113">
<databind alias="U_f2" databound="1" table="@SAP_TSML" />
    <ExtendedObject />
    </column>

        </action>
    </columns>
    </specific>
</item>

<item AffectsFormMode="1" backcolor="-1" description="" disp_desc="0" enabled="1"
font_size="0" forecolor="-1" from_pane="0" linkto="" right_just="0" supp_zeros="0"
tab_order="0" text_style="0" to_pane="0" visible="1" uid="tab_1" width="120"
height="19" top="90" left="125" type="99">
    <AutoManagedAttribute />
    <specific AffectsFormMode="0" caption="SAP_TSML2"
val_off="0" val_on="2">
        <databind alias="FolderDS" databound="1" table="" />
    </specific>
</item>

<item AffectsFormMode="1" backcolor="-1" description="" disp_desc="0" enabled="1"
font_size="0" forecolor="-1" linkto="" right_just="0" supp_zeros="0" tab_order="0"
text_style="0" visible="1" uid="rect_1" width="500" height="165" top="108" left="5"
type="100" to_pane="1" from_pane="1">
    <AutoManagedAttribute />
</item>

<item AffectsFormMode="1" backcolor="-1" description="" disp_desc="0" enabled="1"
font_size="0" forecolor="-1" linkto="" right_just="0" supp_zeros="0" tab_order="0"
text_style="0" visible="1" uid="mtx_1" width="490" height="155" top="113" left="10"
type="127" to_pane="1" from_pane="1">
    <AutoManagedAttribute />

```

```

        <specific SelectionMode="2" layout="0"
titleHeight="20">
            <columns>
                <action type="add">

<column AffectsFormMode="1" bgcolor="-1" description="" disp_desc="0" editable="1"
font_size="12" forecolor="-1" right_just="0" text_style="0" visible="1" val_off=""
val_on="" title="#" uid="col_f" width="20" type="16" />

<column AffectsFormMode="1" bgcolor="-1" description="" disp_desc="0" editable="1"
font_size="12" forecolor="-1" right_just="0" text_style="0" visible="1" val_off=""
val_on="" title="f1" uid="col_0" width="450" type="16">
<databind alias="U_f1" databound="1" table="@SAP_TSML2" />
                <ExtendedObject />
                </column>

            </action>
            </columns>
        </specific>
    </item>
</action>

</items>
    <DataBrowser BrowseBy="3" />
    <items>
        <action type="group">
            <item uid="tab_0" />
            <item uid="tab_1" />
        </action>
    </items>

</form>
    </action>
</forms>
</Application>

```

## Related Contents

[To learn more about automatic form generation for UDOs you can download Business One Development Environment package](#)

For more information, visit the [Business One homepage](#).

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