Microsoft Dynamics NAV

Treemap Business Data Visualization for Microsoft Dynamics NAV 2009 SP1

Partner Community Release

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OVERVIEW

The Treemap Business Data Visualization for Microsoft Dynamics® NAV provides a unique view on business data. It can provide insight from different data perspectives and can be used to help identify outliers and actionable items. Combined with histogram-based visual filtering and integration into business logic and the user interface (UI) of the RoleTailored client, this is a powerful tool for end users.

The Partner Community Edition release provides the Treemap visualization as a RoleTailored client control add-in for Microsoft Dynamics NAV 2009 SP1. It includes a server-side object, a codeunit for data processing, and a sample page. The sample uses the Treemap visualization control in a Treemap analysis place for customers. This place is a sample for how you can integrate the visualization into other application scenarios.

You can use the Partner Community Edition of the Treemap Business Data Visualization for Microsoft Dynamics NAV to integrate the visualization into customer projects and your add-on solutions with Microsoft Dynamics NAV 2009 SP1. No dedicated granule is required. For details on the terms of the license, see the Software License Terms - Treemap Business Data Visualization.rtf file.

The Partner Community Edition of the Treemap Business Data Visualization for Microsoft Dynamics NAV is an unsupported release. You can send an e-mail message with feedback on usability and suggestions for improvements to christian.abeln@microsoft.com. You can also see the Microsoft Dynamics NAV team blog or the dedicated add-in blog. We cannot provide assistance on specific issues with implementing Treemap visualizations in Microsoft Dynamics NAV, but your suggestions may be used to help drive improvements and provide additional information.

This white paper describes how to use Treemap Business Data Visualizations in custom application scenarios. The guide starts with a high-level overview and then provides the steps to set it up for customer analysis. It describes the supported user interactions and provides step-by-step information for setting up and installing custom application scenarios. It also describes how to use the visualization add-in.

BUSINESS DATA VISUALIZATIONS

Business Data Visualizations for Microsoft Dynamics NAV are characterized by the following five pillars.

- Picture your business (delivers mental models).

  Visualizations provide a mental model for business data and data dependencies. It can be characterized by the saying, “A picture is worth a thousand words.” By seeing a visual representation of data and data dependencies, even nonexpert users can more easily understand business data.

- Understand your business; know state and trends (provides insight).

  Visualizations are an entry point for understanding the current state of a business and trends. Users can drill down and filter data to provide intuitive, *ad hoc* analysis.

- Know how to act (identifies actionable tasks).

  Users can find items of interest and outliers in business data that are based on certain objectives or measures. Those outliers can be converted into high-priority actionable tasks and possible actions.

- Act wisely (provides decision support, problem solvers, and optimization).

  Problem solvers and optimizers help users decide on a strategy. They can provide suggestions for an action strategy that can lead to an optimal result for one or more objectives.

- Understand consequences (visualizes consequences before acting).

  Visualizations help users understand the impact of actions before they are committed. Visualizers can account for dependencies, predict the outcome of actions, and provide visualizations to users.

TREEMAP BUSINESS DATA VISUALIZATION

The Treemap Business Data Visualization provides insight into business data. Users look at business data from different perspectives. In a Treemap visualization, a *perspective* is composed of two measurements, which define the appearance of size and color for each data element. The brain can efficiently process large sets of data based on size and color, which makes the Treemap visualization very effective.

The Treemap visualization is complemented with visual filtering on top of a data histogram for each selected measurement. The histogram provides an overview of how many data items appear in the range of values that is defined by the full measurement value range. Users can then use intuitive range filtering to adjust the upper or lower boundary of the range of values from which data objects are visualized.

With visual filtering, users can see data items disappear or appear dynamically and transition smoothly in size and color. The brain can follow and keep track of dynamic changes for a large number of visual elements simultaneously, which makes the visualization even more effective.

Users can use these visual tools to better understand a set of business objects with the range of values of multiple measurements in one picture. Users can then discover unexpected correspondences and also validate that data follows presumed correspondences.

The Treemap visualization also helps identify actionable items and answers to questions, such as which business data items fall out of typical procedures? Which data items are the most important ones to act on? Where does an action have the most impact?

These questions can frequently be answered by looking at outliers in presumed correspondences of measurements for a business situation. These business data items typically do not follow the presumed correspondences and anticipated flow of data.

The Treemap visualization provides direct access to relevant UI pages so that users can act on the business data object behind a Treemap field.

COMPONENTS IN THIS RELEASE

The following components are included in the Partner Community Edition:

REDISTRIBUTABLE COMPONENTS

- Files for the Treemap visualization RoleTailored client control add-in in the Treemap visualization - Partner Community Edition folder.
- The Microsoft.Dynamics.Visualizations.TreeMap.DataBuilder.dll assembly for server-side data processing.

SAMPLE CODE

- The TreeMapViz-PartnerCommunityEdition.fob file or TreeMapViz-PartnerCommunityEdition.txt file, which contain the codeunit and sample code.

DOCUMENTATION

- The Software License Terms - Treemap Business Data Visualization.rtf file, which contains the terms for using the Partner Community Edition release.
- The Partner Community Edition - Treemap Business Data Visualization for Microsoft Dynamics NAV.pdf file, which describes what the Treemap visualization is, how to install it with the demo database, and how to use it with other pages.

INSTALLING AND RUNNING THE SAMPLE VISUALIZATION

The Partner Community Edition is delivered as a self-extractable archive. It includes a codeunit for generic data handling and a sample page to demonstrate the visualization in an application scenario.

To perform a quick installation and run the sample visualization

1. On the computer running all three tiers of Microsoft Dynamics NAV 2009 SP1 with the demo database, run the Treemap Business Data Visualization for Microsoft Dynamics NAV (ver 1.0.6, Partner Community Edition).exe self-extracting archive.

   By default, the files are installed to C:\Program Files\Microsoft Dynamics NAV\60\Treemap (Partner Community Edition) on a 32-bit edition of Windows® or C:\Program Files (x86)\Microsoft Dynamics NAV\60\Treemap (Partner Community Edition) on a 64-bit edition of Windows.
2. In the Classic client, on the **Tools** menu, click **Object Designer**.
3. On the **File** menu, click **Import**.
4. Locate the TreeMapViz-PartnerCommunityEdition.fob or TreeMapViz-PartnerCommunityEdition.txt file, and then click **Open**.
5. When no conflicts are found, click **Yes** to import all objects.
6. In the **Import Objects** dialog box, click **OK**.
7. In the **Client Add-in** table, add the following values in a new row to register the control add-in:
   - **Control Add-in Name**: TreeMapViz
   - **Public Key Token**: 31bf3856ad364e35
   - **Version** (optional): 1.0.6
   - **Description** (optional): Treemap Business Data Visualization - Partner Community Edition
8. Open the following URL: dynamicsnav:////RunPage?Page=55555.

TREEMAP VISUALIZATION FEATURES IN THE DEMO DATABASE

Page 55555 is a Treemap analysis place for customers. The Treemap visualization replaces the typical list-type representation for customers with the following color and size codes.

- Color code: Customers with large values of the color measure are displayed in blue, small values are displayed in red, and average values are displayed in gray.
- Size code: Customers with large values of the size measure are displayed as large rectangles, and small values are displayed as small rectangles.

You can try the following interactions to better understand the UI concepts.

- Select a measure for the **Show color for** and **Show size for** fields. Set the focus in one of the drop-down menus and use the UP ARROW and DOWN ARROW keys to step through the measures. The visualizations are animated and change when you step through them.
- Click **Customer List**, and then click **Advanced filter**. Enter a filter row to see the visualization change to show the different set of customers in the dataset.
- Set the focus on a cell in the Treemap, and then press the arrow keys to step through the cells in the visualization. When you move to another cell and wait for half a second, the FactBoxes are updated to show the details of the selected Treemap cell.
- Double-click a cell or press ENTER on the selected cell. The Customer card for that customer is opened.
- Experiment with the visual range filter for the color measure at the bottom of the Treemap and the size measure on the left side. Integrated histograms and the value legend provide an intuitive filtering experience.

While dragging, hover over and drag the handles on the left and right side to change the range.

Hover over and drag the connection between the handles to move the range. Double-click the connection between the handles to revert to the full range or to the last reduced range.

Note that if you range-filter out a number of customers for one measure, then the histogram for the other measure reflects the filtered-out customers through hatched brush filling of the respective bars in the histogram.

INTEGRATING WITH CUSTOMER DATABASES AND PARTNER SOLUTIONS

REDISTRIBUTABLE COMPONENTS

You can redistribute the Treemap visualization components to computers running the RoleTailored client and Microsoft Dynamics NAV Server.

To manually install redistributable components for the RoleTailored client

1. Navigate to the Treemap visualization – Partner Community Edition folder. By default, the files are installed at C:\Program Files\Microsoft Dynamics NAV\60\RoleTailored Client\Add-Ins.
2. To manually distribute these files to a computer running the RoleTailored client, copy this folder to the Add-Ins folder on that computer.

To manually install redistributable components for Microsoft Dynamics NAV Server

1. Navigate to the Treemap (Partner Community Edition) folder. By default, the files are installed at C:\Program Files\Microsoft Dynamics NAV\60.
2. To manually distribute these files to a computer running Microsoft Dynamics NAV Server, copy this folder to the 60 folder on that computer.
3. Run the Register DataBuilder.cmd file to register the data builder component.
4. Run the UnRegister DataBuilder.cmd file to unregister the data builder component to uninstall the Treemap visualization.

SAMPLE CODE

The Treemap visualization comes with a codeunit for generic data handling and a sample page that shows how to use the visualization in an application scenario.

To import and customize the codeunit and sample page

1. In the Classic client, on the **Tools** menu, click **Object Designer**.
2. On the **File** menu, click **Import**.
3. Locate the TreeMapViz-PartnerCommunityEdition.fob or TreeMapViz-PartnerCommunityEdition.txt file, and then click **Open**.
4. When no conflicts are found, click **Yes** to import all objects.
5. In the **Import Objects** dialog box, click **OK**.
6. In the **Client Add-in** table, add the following values in a new row to register the control add-in:
   - **Control Add-in Name**: TreeMapViz
   - **Public Key Token**: 31bf3856ad364e35
   - **Version** (optional): 1.0.6
   - **Description** (optional): Treemap Business Data Visualization - Partner Community Edition
7. In Object Designer, locate codeunit 55555, Treemap AddInCode, and page 55555, Customer Treemap Analysis. You can renumber the objects for your database, and you can also use page 55555 as a template for using the visualization in other pages.
8. In Object Designer, click **Page**, and then find page 22, Customer List.

9. Add an action that that opens page 55555, Customer Treemap Analysis. For information about adding actions to page 22, Customer List, see [Walkthrough: Adding Actions to a Customer List Page](#).

   - You can use the following values for the **CaptionML** property:

     DAN=Treemap-analyse;DEU=Treemap Analyse;ENU=Treemap Analysis;ESP=Análisis de Treemap;FRA=Analyse Treemap;ITA=Analisi Treemap;NLD=Treemap-analyse;FRC=Analyse Treemap

   - You can use the following values for the **PromotedActionCategoriesML** property:

     DAN=Ny,Proces,Rapport,Analyse;DEU=Neu,Vorgang,Bericht,Analyse;ENU=New,Process,Report,Analysis;ESP=Nuevo,Proceso,Informe,Análisis;FRA=Nouveau,Processus,État,Analyse;ITA=Nuovo,Processo,Report,Analisi;NLD=Nieuw,Proces,Lijst,Analyse;FRC=Nouveau,Processus,Rapport,Analyse

10. On the action, set the **PromotedCategory** property to **Category4**, and then select an action image such as **Segment**.

11. Run page 22, Customer List, and then see the **Treemap Analysis** action in the Action Pane.

12. Click **Treemap Analysis** to run page 55555, Customer Treemap Analysis.

WALKTHROUGH: USING THE TREEMAP VISUALIZATION IN ANOTHER PAGE

In the previous procedures, you have registered the Treemap visualization control add-in in the database and enabled the sample page, which runs the Treemap visualization on page 22, Customer List. In this walkthrough, you will:

- Add the Treemap control add-in to a page.
- Populate the Treemap with data.
- Integrate the Treemap with filtering.
- React to events from the Treemap control add-in.

To add the Treemap control add-in to the Sales Order page

First, you create a new Treemap visualization page for sales orders.

1. In Object Designer, copy page 9305, Sales Order List, and change the page number to 55556 and the page name to Sales Order Analysis.
2. In Page Designer, open page 55556, Sales Order Analysis.

   On that page, a list appears like on a typical list place. You will make the Treemap visualization appear instead.
3. Remove the <Control1> group of GroupType Repeater with all child fields and add one field for the Treemap visualization instead.

4. For the new field, select the TreeMapViz control add-in from the lookup for the ControlAddIn property.
5. Save and compile the page.
6. In Object Designer, select page 55556, Sales Order Analysis, and then click **Run** to display the following page.

To populate the Treemap control add-in with data

Once you have updated the page, you must get data into the Treemap control add-in. The Treemap control add-in can process XML data of a certain format.

1. Bind the XML data to a global variable on the page of type BigText.

2. Populate the _xml variable with data, which you can do based on the sample code that is included in codeunit 55555.

   This codeunit has a MakeTreeMapXmlData method, which is generic and can be used on any table. It uses the Treemap Data Builder COM object to build valid Treemap XML data.

   The MakeTreeMapXmlData method optionally collects information about all fields in a table of type Decimal and includes this information in the Treemap XML data. The visualization uses this information to populate the drop-down field selectors for the size and color measures. A page that calls the MakeTreeMapXmlData method sends the setup information only once when it initializes the page.

   The MakeTreeMapXmlData method also adds the values for the two referenced fields of all rows in the table to the XML.

   This control add-in combines optional setup information and data to show in one XML data stream that is sent to the visualization control. You can use this as a best practice for your own visualization control add-ins.

3. Add a Sales Order–specific method to the page.

```
PROCEDURE MakeTreeMapData@6(addSelectableMeasures@1005 : Boolean);
VAR
    myRec@1001 : Record 36;
    recRef@1002 : RecordRef;
    currentPos@1000 : Text[1024];
    colorField@1003 : FieldRef;
    sizeField@1004 : FieldRef;
    captionField@1006 : FieldRef;
BEGIN
    myRec.COPYFILTERS(Rec);
    recRef.GETTABLE(myRec);
    IF (_colorFieldNo >= 0) THEN
      colorField := recRef.FIELD(_colorFieldNo);
    IF (_sizeFieldNo >= 0) THEN
      sizeField := recRef.FIELD(_sizeFieldNo);
    captionField := recRef.FIELD(_captionFieldNo);

    currentPos := Rec.GETPOSITION();
    recRef.SETPOSITION(currentPos);

    _treeMapUtil.MakeTreeMapXmlData(recRef,
                                    captionField,
                                    colorField, sizeField,
                                    addSelectableMeasures,
                                    _xml);
    END;
```

4. Add code to page 55556. You can use the code in page 55555 as a template.

```
OnInit=BEGIN
          _captionFieldNo := 3;
          _colorFieldNo := 60;
          _sizeFieldNo := 122;
       END;

OnOpenPage=BEGIN
               MakeTreeMapData(TRUE);
           END;
```

The new P55556.MakeTreeMapData method uses values for the currently selected field for color and size. That field is used to get the title in a Treemap field, and these values are maintained as global page variables and initialized in the OnInit function. The Treemap page calls the XML data generation the first time and includes the setup information for only this time in the OnOpenPage function.

5. Run page 55556, Sales Order Analysis, to display the Treemap visualization.

To integrate the Treemap visualization with the Filter pane on the page

You can filter the data that is displayed in the Treemap visualization with filters that you set in the Filter pane. When you change the filter, the Treemap visualization changes to reflect the updated data. It will remove or add Treemap fields, and it will also change size and color based on the updated data.

To support filtering, you listen for changes in the OnFindRecord trigger and must implement the OnNextRecord trigger. When the filter changes, new XML data is generated for the Treemap visualization. However, the setup information is not sent each time.

- Add the following code:

```
OnFindRecord=VAR
              found@1000 : Boolean;
            BEGIN
              found := Rec.FIND(Which);
              IF (Which = '=><') THEN
              BEGIN
                MakeTreeMapData(TRUE);
              END
              ELSE IF ((Which <> '-') AND (Which <> '+') AND (Which <> '=')) THEN
              BEGIN
                IF (_lastFilters <> Rec.GETFILTERS()) THEN
                BEGIN
                  _lastFilters := Rec.GETFILTERS();
                  MakeTreeMapData(FALSE);
                END;
              END;
              EXIT (found);
            END;

OnNextRecord=BEGIN
              EXIT (Rec.NEXT(Steps));
            END;
```

To set up reacting to events from the Treemap control add-in

The Treemap control add-in sends the following Treemap-specific messages through the OnControlAddIn trigger.

Message	ID	Data
Measures changed	100	Two comma-separated field numbers
Treemap field activated	101	Record ID behind the Treemap field
Treemap field selected	102	Record ID behind the Treemap field

If you change the measures on the visualization, then the **Measures changed** event occurs, and the Treemap gets fresh data for the selected fields.

If you double-click a Treemap field or press ENTER in the currently selected field, then the **Treemap field activated** event occurs. The corresponding task page for the record that is underlying the Treemap field is opened.

If you select a Treemap field with the mouse or keyboard, then the **Treemap field selected** event occurs. The page synchronizes the FactBoxes with the selected record.

> **Note** There is built-in latency before sending the **Treemap field selected** event to ensure that the selection is intentional and that you are not cycling through the Treemap visualization with the keyboard.

- Add the following code:

```
{ 1   ;1   ;Field     ;
             Name=<Treemap>;
             CaptionML=ENU=<Treemap>;
             SourceExpr=_xml;
             ControlAddIn=[TreeMapViz;PublicKeyToken=31bf3856ad364e35];
             OnControlAddIn=BEGIN
                              HandleAddInMessage(Index, Data);
                            END;
                             }
```

The following code handles the messages from the Treemap control add-in:

```
PROCEDURE HandleAddInMessage@4(Index@1000 : Integer;Data@1001 : BigText);
VAR
  pos@1005 : Integer;
  myRec@1004 : Record 36;
  recId@1003 : RecordID;
  recRef@1007 : RecordRef;
  myCard@1002 : Page 42;
  txt@1006 : Text[30];
BEGIN
  CASE Index OF
    // EVENTID_MeasuresChanged
    100:
    BEGIN
      pos := Data.TEXTPOS(',');
      Data.GETSUBTEXT(txt, 1, pos-1);
      IF (NOT EVALUATE(_colorFieldNo, txt)) THEN
        _colorFieldNo := -1;
      Data.GETSUBTEXT(txt, pos+1, Data.LENGTH-pos);
      IF (NOT EVALUATE(_sizeFieldNo, txt)) THEN
        _sizeFieldNo := -1;
      MakeTreeMapData(FALSE);
    END;
    // EVENTID_ItemActivated
    101:
    BEGIN
      recRef.GETTABLE(myRec);
      Data.GETSUBTEXT(txt, 1, Data.LENGTH);
      EVALUATE(recId, txt);
      IF (recRef.GET(recId)) THEN
      BEGIN
        recRef.SETTABLE(myRec);
        myCard.SETRECORD(myRec);
        myCard.RUN();
      END;
    END;
    // EVENTID_ItemSelected
    102:
    BEGIN
      recRef.GETTABLE(myRec);
      Data.GETSUBTEXT(txt, 1, Data.LENGTH);
      EVALUATE(recId, txt);
      IF (recRef.GET(recId)) THEN
      BEGIN
        recRef.SETTABLE(myRec);
        CurrPage.SETRECORD(myRec);
      END
      ELSE
        MESSAGE('Not Found: ' + txt);
    END;
  END;
```

NEXT STEPS

You should be able to use the Treemap visualization in other scenarios. Find application scenarios that could benefit from using the Treemap Business Data Visualization, and work with your customers to try it out in real customer environments. Ask your customers and users how helpful the visualization is in performing their daily work.

Microsoft Dynamics is a line of integrated, adaptable business management solutions that enables you and your people to make business decisions with greater confidence. Microsoft Dynamics works like and with familiar Microsoft software, automating and streamlining financial, customer relationship, and supply chain processes in a way that helps you drive business success.

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