Mobile Analytics Kit
Developer Guide: HTML5

Sybase Unwired Platform 2.1 ESD #2

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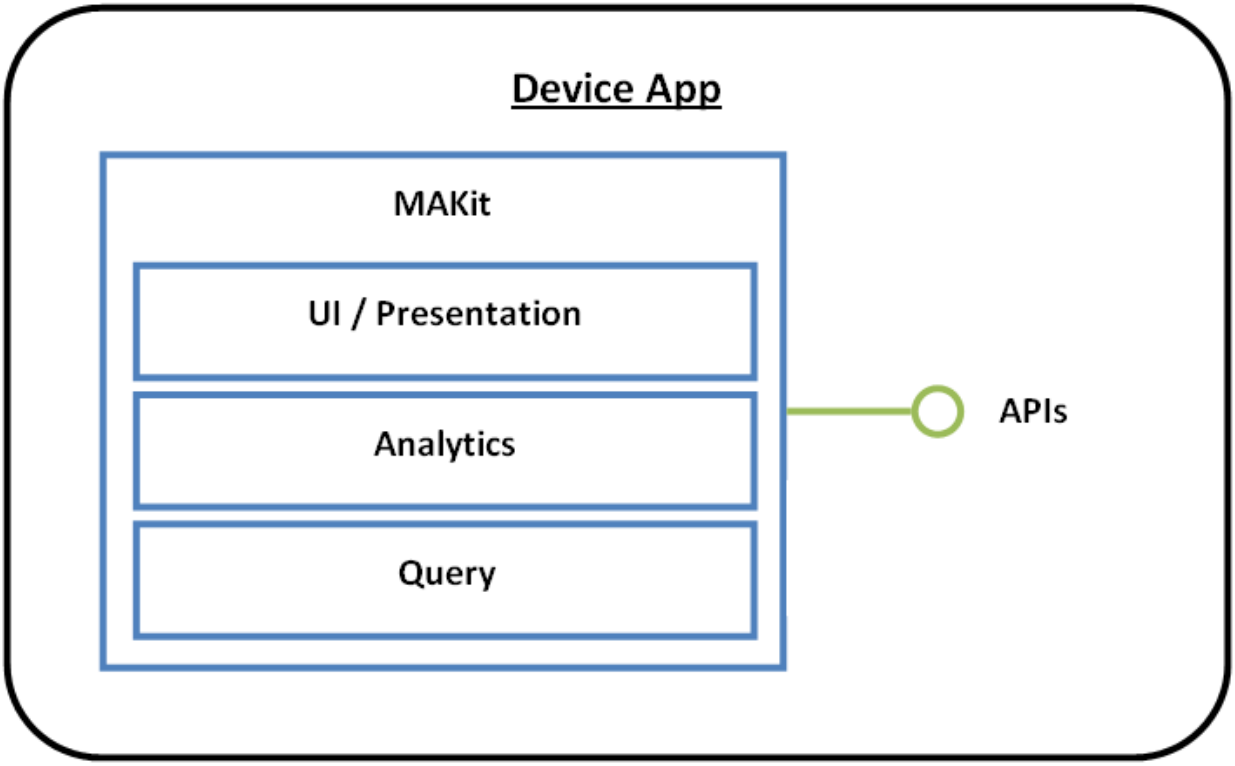
Introduction

The *MAKit Developer Guide: HTML* is to help developers quickly understand Mobile Analytics Kit (MAKit) concepts, and expedite application development. MAKit, which lets users graphically view data and modify chart values to examine "what-if" scenarios, is distributed as JavaScript and css files.

MAKit provides a set of easy-to-use APIs and metadata that allows application developers to build analytical applications that visualize the data retrieved in the Hybrid Web Container.

Architecture

This figure shows the MAKit modules. `UI/Presentation` includes the UI with its views. `Analytics` processes on-device analytics, and `Query` provides a standard way to feed data into MAKit. The APIs offer flexibility and customization options.



Creating a Chart Using MAKit

Creating a Static Web Project in Eclipse

1. Select **File > New > Static Web Project**.
2. Specify a project name. Click **Finish**.

Importing MAKit JavaScript and CSS Files to the Project

1. Right-click the **WebContent** folder, select **New > Folder**, and add a new folder called `css.` Import the MAKit `css` files to the `css` folder.
2. Right-click the **WebContent** folder, select **New > Folder**, and add a new folder called `scripts.` Import the MAKit JavaScript files to the `scripts` folder.

3. Right-click the **WebContent** folder, select **New > Folder**, and add a new folder called `images`. Import the MAKit image files to the `scripts` folder.

Adding a Metadata File

1. Right-click the **WebContent** folder, select **New > Folder**, and add a new folder called `metadata`.
2. Right-click the **metadata** folder, select **New > File**, and add a new file called `mychart.xml`. Copy this chart metadata to the file:

```
<Chart Name="chart_1" ChartType="column" Query="revenue" Title="Revenue">

        <Category Column="year"/>

        <Series Column="product"/>

        <Values>

                <Value Expression="revenue" Format="currency"/>

        </Values>

</Chart>
```

Adding an HTML File

1. Right-click the **WebContent** folder, select **New > HTML file** and create an HTML file.
2. Include this meta element to specify initial scale and device width:

```
<meta name="viewport" content="initial-scale=1; maximum-scale=1; user-scalable=0; width=device-width;"/>
```

3. Include this MAKit css file:

```
<link rel="stylesheet" href="css/default.css" type="text/css"/>
```

4. Include this MAKit JavaScript file:

```
<script src="scripts/Sybase.MA-min.js"></script>
```

Adding a Chart

1. Add an HTML DIV element to be used as a container for the chart. Specify the width and height of the DIV element in the code (as shown below), or during page initialization. The default width of a DIV element is 100%.

```
<div id="chart_1" style="height:500px;"></div>
```

2. Create a full-view chart by adding the code below. The chart must be created with an ID of HTML DIV element. The second argument is optional and specifies whether to create a full-view chart. By default, a chart includes only the Graph view, whereas a full-view chart includes Toolbar, Graph, Table, Range Selector, What-If, and Analysis views. By default, the What-if and Dynamic Analytic views are invisible, and can be customized on an initialized event. Use the **titlechanged** event to display a title on the navigation bar in a full-view chart.

```
<script type="text/javascript">

window.onload = function() {

        var chart = new $MA.Chart("chart_1", true);

        chart.bind("initialized", onInitialized);

        chart.bind("titlechanged", onTitleChanged);

        chart.load("metadata/mychart.xml");
```

```
}


function onInitialized(id) {

        // Write your code to show or hide chart components

}


function onTitleChanged(title) {

        // Write your code to show title on navigation bar

}

</script>
```

Feeding Data via the Query Function

1. The application must implement the **executeMAQuery** function to feed data to MAKit. This allows the application to retrieve data from any datasource and to preprocess data before sending it to MAKit. The source of data is transparent to MAKit. This sample uses the "revenue" query:

```
function executeMAQuery(chartObj, name, args)

{

        var dataTable;

        if (name == "revenue")

                dataTable = getRevenueData();

        chartObj.setDataTable(dataTable);

};
```

2. Create a data table in each query function, and within the data table, create all columns required by the chart. For this sample, the "year" column is required for category, the "product" column is required for series, and the "revenue" column is required for values.

```
function getRevenueData()

{

        var dataTable = new $MA.DataTable();

        dataTable.addColumn("year", "number");

        dataTable.addColumn("product", "string");

        dataTable.addColumn("revenue", "number");

        dataTable.addRow ([2009, "Product 1", 100]);

        dataTable.addRow([2009, "Product 2", 150]);

        dataTable.addRow ([2010, "Product 1", 120]);

        dataTable.addRow([2010, "Product 2", 80]);
```

```
        return dataTable;

}
```

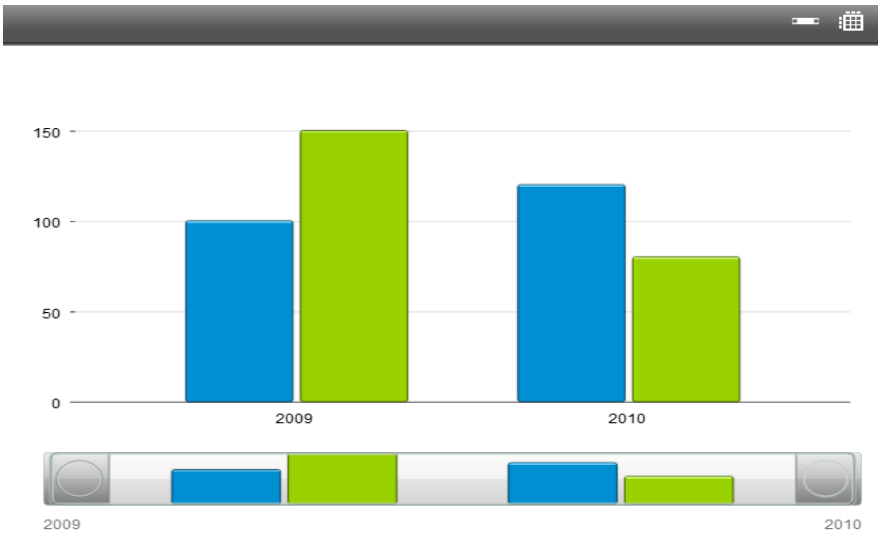
Viewing the Chart

1. This is the complete code for this basic chart:

```
<!DOCTYPE html>

<html>

<head>

<meta name="viewport" content="initial-scale=1; maximum-scale=1; user-scalable=0; width=device-
width;"/>

<title>Insert title here</title>

<link rel="stylesheet" href="css/default.css" type="text/css"/>

<script src="scripts/Sybase.MA-min.js"></script>

</head>

<body>

<script type="text/javascript">

window.onload = function() {

        var chart = new $MA.Chart("chart_1", true);

        chart.bind("initialized", onInitialized);

        chart.bind("titlechanged", onTitleChanged);

        chart.load("metadata/mychart.xml");

}

function onInitialized(id) {

        // Write your code to show or hide chart components

}

function onTitleChanged(title) {

        // Write your code to show title on navigation bar

}

function executeMAQuery(chartObj, name, args)

{

        var dataTable;

        if (name == "revenue")

                dataTable = getRevenueData();
```

```
        chartObj.setDataTable(dataTable);

};

function getRevenueData()

{

        var dataTable = new $MA.DataTable();


        dataTable.addColumn("year", "number");

        dataTable.addColumn("product", "string");

        dataTable.addColumn("revenue", "number");

        dataTable.addRow ([2009, "Product 1", 100]);

        dataTable.addRow([2009, "Product 2", 150]);

        dataTable.addRow ([2010, "Product 1", 120]);

        dataTable.addRow([2010, "Product 2", 80]);

        return dataTable;

}


</script>

<div id="chart_1" style="height:500px;"></div>

</body>

</html>
```

2. Right-click your project name, and select **Run As > Run on Server.** Click **Finish.**



Sorting the Chart Category

Change the sort order by calling the **setCategorySortOrder** function. Supported sort orders include:

- Ascending (default) – sorts the category column and zooming columns in ascending order.
- Descending – sorts the category column and zooming columns in descending order.
- Partial – keeps the order of category column and sorts the zooming columns in ascending order.
- None – no sorting. Use this option only if the data is already sorted by category.

Refreshing the Chart

Add this code to refresh the chart when the tablet orientation is changed. The **orientationchange** event is not yet supported by all browsers. You may be able to use the **resize** event instead, although **resize** may be triggered several times when the orientation is changed. Use the $MA static constructor to find the chart with ID. Use the **orientation** event to change the chart layout and refresh the chart.

```
window.addEventListener(navigator.userAgent.indexOf("iPad") > 0 ? "orientationchange" : "resize",
function() {

        onOrientationChanged();

}, false);



function onOrientationChanged() {

        $MA("chart_1").refresh();

}
```

Creating a Semantic Zooming Chart

Semantic zooming is useful for aggregating data. A commonly used scenario is to aggregate data by year, quarter, and month. Another scenario is to aggregate data by region, country, state, and city. You can also use the chart table to view aggregate data.

Adding a Metadata File

This example defines a semantic zooming chart with three zooming levels: level 1 displays data by year; level 2 displays data by quarter, and level 3 displays data by month:

```
<Chart Name="chart_1" ChartType="column" Title="Revenue">

        <Category/>

        <Series Column="product"/>

        <Values>

                <Value Expression="revenue" Format="currency"/>

        </Values>

        <ZoomingLevels>

                <ZoomingLevel Query="productRevenueByYear" CategoryColumn="year" Title="Year"/>

                <ZoomingLevel Query="productRevenueByQuarter" CategoryColumn="quarter"
Title="Quarter"/>
```

```
                <ZoomingLevel Query="productRevenueByMonth" CategoryColumn="month" Title="Month"/>

        </ZoomingLevels>

</Chart>
```

Feeding Data

1. The data table returned by queries of the three zooming levels must reflect the zooming relationship. In this example, the level 1 query returns a table with these columns: 1) “year”, 2) “product”, and 3) ”revenue”. The level 2 query returns a table with these columns: 1) “year”, 2) “quarter”, 3) “product”, and 4) “revenue”. The level 3 query returns a table with these columns: 1) “year”, 2) “quarter”, 3) “month”, 4) “product”, and 5) “revenue”.

2. This sample uses the “productRevenueByYear”, “productRevenueByQuarter”, and “productRevenueByMonth” queries:

```
function executeMAQuery(chartObj, name, args)

{

        var dataTable;

        if (name == "productRevenueByYear")

                dataTable = getProductRevenueByYearData();

        if (name == "productRevenueByQuarter")

                dataTable = getProductRevenueByQuarterData();

        if (name == "productRevenueByMonth")

                dataTable = getProductRevenueByMonthData();

        chartObj.setDataTable(dataTable);

};
```

3. This sample uses SQLite test data.. The year, product, and sum (revenue) are retrieved for the level 1 query. The data is retrieved asynchronously, and the chart should be refreshed when data retrieval is completed.

```
function getRevenueByYearData()

{

        var dataTable = new $MA.DataTable();

        dataTable.addColumn("year", "number");

        dataTable.addColumn("product", "string");

        dataTable.addColumn("revenue", "number");



        if (window.openDatabase)

        {

                var db = window.openDatabase("mademo", "1.0", "HTML5 MAKit Demo App", 1024 *
1024);

                if (!db)
```

```
                        alert("Failed to create DB");



                db.transaction(

                    function(tx) {

                        tx.executeSql("SELECT year, product, SUM(revenue) FROM ProductRevenue
GROUP BY year, product", [],

                                function(tx, result)

                                {

                                                var row;

                                                for(var i = 0; i < result.rows.length; i++) {

                                                row = result.rows.item(i);

                                                dataTable.addRow(row);

                                        }

                                        dataTable.refresh();

                                },

                                function(tx, e)

                                {

                                        alert(e.message);

                                });

                    }

                );

        }

        return dataTable;

}
```

4. The level 2 query retrieves the year, quarter, product, and sum (revenue):

```
var sql = "SELECT year, quarter, product, SUM(revenue) FROM ProductRevenue GROUP BY year, quarter,
product;";
```

5. The level 3 query retrieves, the year, quarter, month, and sum (revenue):

```
var sql = "SELECT year, quarter, month, product, SUM(revenue) FROM ProductRevenue GROUP BY year,
month, product;";
```

Viewing the Zooming Chart

By default, the top-level zooming chart is shown. Click zooming buttons in the toolbar to view data by quarter and month.

Year Quarter Month

	Quarter	prod1	prod2	prod3	prod4
2001	1	$185.07	$127.91	$195.32	$155.33
	2	$194.90	$264.29	$214.91	$162.38
	3	$153.41	$178.26	$194.95	$102.13
	4	$163.83	$178.92	$169.29	$162.87
2002	1	$279.89	$163.19	$153.08	$206.16
	2	$217.08	$220.82	$171.22	$222.04
	3	$161.64	$183.46	$175.75	$185.71

Creating a Drilldown Group

Use a drilldown group to filter data and show it in different chart types. The filter action is triggered by a double-click or a tap on a chart. Drilldown also supports chart tables and semantic zooming charts.

Adding a Metadata File

This example defines a DrillDownGroup with three charts: level 1 displays data by year; level 2 displays data by quarter, and level 3 displays data by month:

```
<DrillDownGroup>

        <Chart Name="chart_1" ChartType="column" Query="productRevenueByYear" Title="Revenue By
Year">

                <Category Column="year"/>

                <Series Column="product"/>

                <Values>

                        <Value Expression="revenue" Format="currency"/>

                </Values>
```

```
        </Chart>

        <Chart Name="chart_2" ChartType="column" Query="productRevenueByQuarter" Title="Revenue By
Quarter">

                <Category Column="quarter"/>

                <Series Column="product"/>

                <Values>

                        <Value Expression="revenue" Format="currency"/>

                </Values>

        </Chart>

        <Chart Name="chart_3" ChartType="column" Query="productRevenueByMonth" Title="Revenue By
Month">

                <Category Column="month"/>

                <Series Column="product"/>

                <Values>

                        <Value Expression="revenue" Format="currency"/>

                </Values>

        </Chart>

</DrillDownGroup>
```

Feeding Data

1. The data table returned by queries of the three drilldown levels must reflect the drilldown relationship. In this example, the level 1 query returns a table with these columns: 1) “year”, and 2) ”revenue”. The level 2 query returns a table with these columns: 1) “quarter”, and 2) “revenue”; additionally, the data is filtered by selected year. The level 3 query returns a table with these columns: 1) “month”, and 2) “revenue”; additionally, the data is filtered by selected year and selected quarter.

2. This sample uses SQLite test data. The level 1 query retrieves the year and sum (revenue)—the same as for the semantic zooming chart.

3. The level 2 query retrieves the quarter, and sum (revenue), which are filtered by selected year. The drilldown information is stored in args and required when retrieving data. There is one arg in level 2, two args in level 3, and so on. Each arg consists of information like itemValue and seriesName. itemValue is an array, so that drilldown can also support a semantic zooming chart. The filter by series action is triggered if only one series is selected.

```
function getRevenueByQuarterData(args)

{

        var dataTable = new $MA.DataTable();

        dataTable.addColumn("year", "number");

        dataTable.addColumn("quarter", "number");

        dataTable.addColumn("revenue", "number");
```

```
        if (window.openDatabase)

        {

                var db = window.openDatabase("mademo", "1.0", "HTML5 MAKit Demo App", 1024 *
1024);

                if (!db)

                        alert("Failed to create DB");



                db.transaction(

                    function(tx) {

                        var sql = "SELECT year, quarter, SUM(revenue) as quarterrevenue FROM
ProductRevenue";

                        if (args)

                        {

                                sql += " WHERE year = ";

                                sql += args[0].itemValues[0];

                        }

                        sql += " GROUP BY year, quarter;";

                        tx.executeSql(sql, [],

                                    function(tx, result) {

                                        var row;

                                        for(var i = 0; i < result.rows.length; i++) {

                                                row = result.rows.item(i);

                                                dataTable.addRow(row);

                                        }

                                        dataTable.refresh();

                                },

                                function(tx, e) {

                                        alert(e.message);

                                }

                                );

                    }

                );
```

```
        }

        return dataTable;

}
```

4. The level 3 query retrieves the month and sum (revenue), which are filtered by selected year and quarter.

```
Var sql = “SELECT year, quarter, month, product, SUM(revenue) AS monthrevenue, month FROM
ProductRevenue”;

if (args)

{

        sql += “ WHERE year = “;

        sql += args[0].itemValues[0];

        sql += “ AND quarter = “;

        sql += args[1].itemValues[0];

}

sql += “ GROUP BY year, month, product;”;
```

Viewing the Drilldown Chart

The top-level drilldown chart appears by default. A breadcrumb trail indicates the selected values. Click any item in the breadcrumb trail to drill back.

Creating a What-If Chart

What-if analysis allows the user to dynamically change input data and see those changes reflected immediately in the chart. The chart value should be computed based on an expression instead of a column. Semantic zooming charts do not support what-if analysis. The jQuery JavaScript and css files are needed for what-if controls.

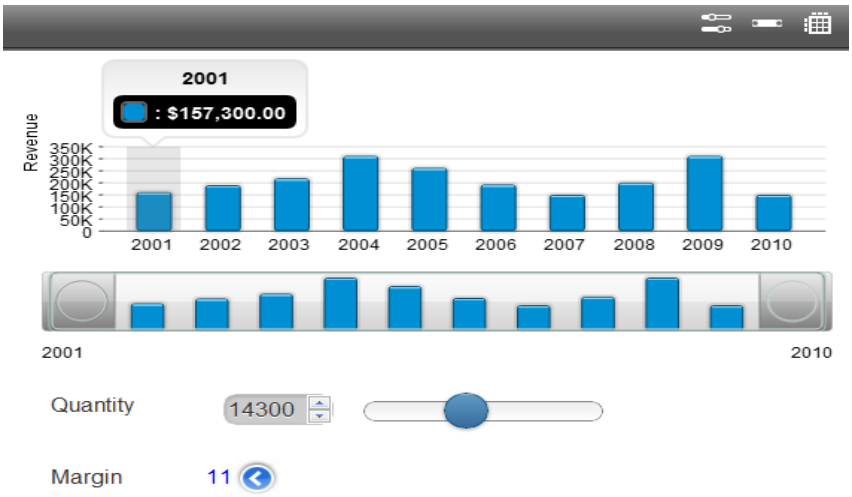
Adding a Metadata File

This example defines a chart that uses what-if analysis:

```
<Chart Name="chart_1" ChartType="column" Query="year_qty_margin" Title="Revenue By Year">

        <Category Column="Year"/>

        <Values>

                <Value Expression="Quantity * Margin" DisplayName="Revenue" Format="currency"/>

        </Values>

        <WhatIfColumns>

                <Column Name="Quantity" Description="Quantity"  VariableType="integer" Value="0"
Min="10000" Max="20000" ></Column>

                <Column Name="Margin" Description="Margin" VariableType="float" Value="0.0"
Min="0.0" Max="50.0" Step="0.5" Decimals="1" ></Column>

        </WhatIfColumns>

</Chart?
```

Viewing the What-If Chart

1. Click the **What-If** icon.
2. Select an item and change the value of the what-if column. The chart values are recomputed and refreshed based on the new value of the what-if column.



Showing the What-If View by JavaScript API

To show a what-if view using JavaScript, use:

```
$MA(chart_id).showWhatIfView(true)
```

Creating a Dynamic Analytics Chart

Dynamic analytics (DA) allows the user to dynamically change value of global variable and immediately see that new value reflected in the chart.

For dynamic analytics, compute the chart value based on an expression instead of a column. Use jQuery JavaScript and css files for DA controls, and load the DA variables before loading a DA chart. You can use both global variables and what-if columns in the same chart.

Adding a Global DA Variables Metadata File

This example defines a DA variables metadata file:

```
<Variables>

        <Variable Name="$testbool" DisplayName="Test Bool" VariableType="boolean" Value="0" />

        <Variable Name="$basevalue" DisplayName="Test Integer" VariableType="integer"
Value="50000" Min="0" Max="100000" />

        <Variable Name="$testinteger" DisplayName="Test description" VariableType="integer"
Value="0" Min="0" Max="100" />

        <Variable Name="$testfloat" DisplayName="Test description" VariableType="float"
Value="20000.0" Min="0.0" Max="50000" Step="0.5" Decimals="2" />

        <Variable Name="$testdate" DisplayName="Test date" VariableType="date" Value="2010-03-22"
/>

        <Variable Name="$testenum" DisplayName="Investment priority on" VariableType="enum"
Selection="1">

                <Choices>

                        <Choice Display="n/a" Value="n/a" />
```

```
                        <Choice Display="Web Ads" Value="Web Ads" />

                        <Choice Display="TV Ads" Value="TV Ads" />

                        <Choice Display="Newspaper Ads" Value="Newspaper Ads" />

                        <Choice Display="Road Shows" Value="Road Shows" />

                        <Choice Display="Conventions" Value="Conventions" />

                </Choices>

        </Variable>

</Variables>
```

Adding a Metadata File

This example defines a chart that uses dynamic analytics:

```
<Chart Name="chart_1" ChartType="column" Query="year_qty_margin" Title="Revenue By Year">

        <Category Column="Year"/>

        <Values>

                <Value Expression="if($testbool, Quantity * Margin, if($testenum=='aa',
$basevalue, if($testdate=='2010-03-22',$basevalue,Quantity * Margin + $basevalue + $testfloat)))"
DisplayName="Revenue" Format="currency"/>

        </Values>

        <WhatIfColumns>

                <Column Name="Quantity" Description="Quantity"  VariableType="integer" Value="0"
Min="10000" Max="20000" ></Column>

                <Column Name="Margin" Description="Margin" VariableType="float" Value="0.0"
Min="0.0" Max="50.0" Step="0.5" Decimals="1" ></Column>

        </WhatIfColumns>

</chart>
```

Loading Global DA Variables Metadata File and Binding DAChanged Event

1. Load the DA variables metadata file before loading the MA initialization script.

```
window.onload = function () {

        $MA.DA.load("../metadata/da_variables.xml");

        $MA.Chart.getStyles();

        arrange(1, 1);

        var chart = new $MA.Chart("chart_1", true);

        chart.bind("initialized", onInitialized);

        chart.load("../metadata/da_chart_bar.xml");

}
```

2. Bind the **DAChanged** event and refresh the chart:

```
$(window).bind("dachanged", onDAChanged);

function onDAChanged(e, daname, value)

{

        $MA("chart_1").refresh();

}
```

Viewing the DA Chart

1. Click the **DA** icon.
2. Change the value of the DA variables. The chart values are recomputed and refreshed based on the new variable value.

Showing the Dynamic Analytics View by JavaScript API

To show the Dynamic Analytics view using JavaScript, use:

```
$MA(id).showDynamicAnalysisView(true);
```

Advanced Features

Creating a Dynamic Chart

1. Create a chart at runtime; the syntax is the contents of XML metadata.

```
var chart = new $MA.Chart("chart_1", true);

chart.create(syntax);
```

2. Change the chart property:

```
chart.setProperty("charttype", chartType);
```

3. Change the chart data:

```
chart.setDataTable(dataTable);
```

Creating a Localized Chart

1. Create a metadata file in a different language (for example, “de”) and place it in a subfolder of the `metadata` folder. The folder name is based on the locale code. The default language and currency symbol are based on system settings.
2. Change the MAKit locale:

```
$MA.setLocale("de");
```

3. Change the MAKit currency symbol:

```
$MA.setCurrencySymbol("€");
```

4. Include the jQuery locale files.
5. When you load the metadata file, the file in the `de` subfolder is loaded.

```
chart.Load("metadata/mychart.xml");
```

Sharing a Chart

1. Bind to the **chartshared** event:

```
chart.bind("chartshared", onChartShared);
```

```
function onChartShared() {

        $MA.Graph.Share.show($MA("chart_1"), "../images/");

}
```

2. Click the **Shared** icon to display the chart sharing screen.
3. Add your own JavaScript wrapper function to save the chart to an image and send it via an e-mail message. The JavaScript wrapper function is usually written in native code and not part of MAKit.

Best Practices

Performance

- Improve performance by sorting data by category before feeding it to the chart.
- Performance may be affected by overusing expressions.

Usability

- Limit the number of series to 16; otherwise, you must change the default CSS file to support more colors.
- Limit the number of categories for bar charts and horizontal bar charts to 1000, for scrolling usability.
- Limit the number of categories for bar charts to 100; otherwise, the entire chart is filled with bubbles.

Functions and Events

$MA

$MA is the namespace of MAKit.

Functions

Function Name	Description
`$MA(id)`	`$MA static constructor.` `Gets the MA object.`
`setCurrencySymbol(currencySumbol)`	`Sets the currency symbol. The default currency symbol is based on system settings. This is a static function.`
`setImageFolder(folder)`	`Sets the images folder. The default folder is "./images/". The images folder holds image files for chart-sharing icons and the range selector. This is a static function.`
`setLocale(locale)`	`Sets the locale. The default locale is based on system settings. This is a static function.`
`isBrowserCompatible`	`Check if MAKIT is compatible with the current browser.`

$MA.Chart

A chart is a composite control that includes Graph, Table, Range Selector, What-if, and Dynamic Analytic views. A chart is created based on metadata that is defined in XML format and stored in an XML file or string.

An HTML DIV element is needed as a container for a chart. The chart must be created with an ID of HTML DIV element.

This is a sample of a simple chart:

```
window.onload = function () {

    var chart = new $MA.Chart("chart_1");

    chart.bind("maximize", onMaximize);

    chart.load("mychart.xml");

}


function onMaximize(id) {

    // Write your code to show Full View Chart

}
```

This is a sample of a full-view chart:

```
window.onload = function() {

    var chart = new $MA.Chart("chart_1", true);

    chart.bind("initialized", onInitialized);

    chart.bind("titlechanged", onTitleChanged);

    chart.load("mychart.xml");

}


function onInitialized(id) {

    // Write your code to show or hide chart components

}


function onTitleChanged(title) {

    // Write your code to show title on navigation bar

}
```

Functions

Function Name	Description
Chart(id, [isFullView])	Chart constructor. id – ID of HTML DIV element. isFullView – [true, false].
applyCSS()	Applies style sheet to the chart.
bind(eventName, function)	Binds a function to a predefined event.

create(syntax)	Creates a chart object.
getNumberOfZoomingLevels()	Gets number of zooming levels.
getProperty(propertyName)	Gets value of the chart property. The property name can also be in dot notation format (for example: name, category.column and values[0].expression).
getStyles()	Applies styles from css file. This is a static function.
getZoomingLevel()	Gets current zooming level of chart.
isDynamicAnalysisViewVisible()	Determines whether the Dynamic Analytics view is visible.
isRangeSelectorViewVisible()	Determines whether the Chart Range Selector view is visible.
isTableViewVisible()	Determines whether the Chart Table view is visible.
isToolBarVisible()	Determines whether the Chart toolbar is visible.
isWhatIfViewVisible()	Determines whether the What-if view is visible.
load(fileName)	Loads a metadata file and creates a chart object.
refresh()	Refreshes the chart.
setCategorySortOrder(value)	Sets category sort order. Value – [“ascending”, “descending”, “partial”, “none”].
setDataTable(dataTable)	Sets data table to the chart.
setLegend(value)	Sets chart legend (for pie charts only). value – [“none”, “left”, “right”, “top”, “bottom”].
setPalette(palette)	Sets the color palette of chart. This is a static function.
setProperty(propertyName, value)	Sets value to the chart property.
setZoomingLevel(level)	Sets chart to zooming level specified by user. level – a zero-based number.
showRangeSelectorView(value)	Shows or hides the Chart Range Selector view. value – [true, false].
showTableView(value)	Shows or hides the Chart Table view. value – [true, false].
showToolBar(value)	Shows or hides the Chart toolbar. value – [true, false].
showWhatIfView(value)	Shows or hides the What-if view. value – [true, false].
showDynamicAnalysisView(value)	Shows or hides the Dynamic Analytics view. value – [true, false].
unbind(eventName)	Unbinds the function to event.

Events

Event Name	Description
chartshared()	This event is triggered when the shared icon is clicked.
initialized(id)	This event is triggered when the chart is initialized. The event should be added to chart before loading.
titlechanged(title)	This event is triggered when the chart title is changed (for a full-view chart only).

maximize(id)	This event is triggered when the maximize icon of chart title bar is clicked (for a simple chart only).

$MA.DataTable

For MAKit HTML5, data is handled by users and assigned to a chart through the **executeMAQuery** function. All queries required by the chart should be handled by this function.

```
function executeMAQuery(chartObj, name, args)

{

    var dataTable;



    if (name == "query1")

            dataTable = getQuery1Data();

    else if (name == "query2")

            dataTable = getQuery2Data();

    …



    chartObj.setDataTable(dataTable);

};
```

Each query function should create a data table, and within the table, all columns required by the chart.

```
function getQuery1Data()

{

    var dataTable = new $MA.DataTable();



    // Create columns required by chart

    dataTable.addColumn("column1", "number");

    dataTable.addColumn("column2", "string");

    dataTable.addColumn("column3", "datetime");



    // Append your data

    dataTable.addRow([123, “ABC”, “2011-02-03”]);



    return dataTable;

}
```

The setData function of **FileDataTable** gets data from a file. Supported file types are “csv”, “xml”, and “json”.

```
function getFileData()

{

    var dataTable = new $MA.FileDataTable();



        dataTable.addColumn("column1", "number");

        dataTable.addColumn("column2", "string");

        dataTable.addColumn("column3", "datetime");



        // Append your data from file

        dataTable.setData("csv", "mydata.csv");

                return dataTable;

}
```

Functions

Function Name	Description
DataTable()	DataTable constructor.
addColumn(name, type)	Creates a table column. Supported types are “number”, “string”, and “datetime”.
addRow(dataRow)	Appends data row to data table.
addRows(dataRows)	Appends data rows to data table.
getNumberOfColumns()	Gets number of columns.
getNumberOfRows()	Gets number of rows.
Refresh	Refreshes the parent control.
setData(fileType, fileName)	Appends data from file to data table (for FileDataTable only). fileType – [“csv”, “xml”, and “json”].

$MA.DrillDownGroup

DrillDownGroup consists of a list of charts that are created based on metadata that is defined in XML format and stored in an XML file or string.

An HTML DIV element is needed as a container for a DrillDownGroup. The DrillDownGroup must be created with an ID of HTML DIV element.

This is a sample of a DrillDownGroup:

```
    window.onload = function () {

        var drillDownGroup = new $MA.DrillDownGroup("dd_1");

        drillDownGroup.bind("titlechanged", onTitleChanged);

        drillDownGroup.load("mydrilldowngroup.xml");
```

```
    }


    function onTitleChanged(title) {

        // Write your code to show title on navigation bar

    }
```

Functions

Function Name	Description
DrillDownGroup(id)	DrillDownGroup constructor. id – ID of HTML DIV element.
bind(eventName, function)	Binds a function to event.
drillDown(itemNumber, [seriesName])	Drills to next chart based on the specified item number and series name.
drillBack()	Drills to prior chart.
getCurrentChart()	Gets the current chart.
refresh()	Refreshes the control.
showToolBar(value)	Shows or hides the toolbar. value – [true, false].
unbind(eventName)	Unbinds the function to event.

Events

Event Name	Description
initialized(id)	This event is triggered when the DrillDownGroup is initialized. The event should be added to DrillDownGroup before loading.
titlechanged(title)	This event is triggered when the DrillDownGroup title is changed.

Tested Operating Systems and Browsers for MAKit

	Browsers	OS
Desktop	Google Chrome 15.0.874	Windows
	Apple Safari 5.1.1	MAC OS
Tablet	Mobile Safari 5.1 on iPad2	iOS5
	Motorala Xoom Default Browser	Android 3.2-1001
	Samsung Galaxy Tab 10.1 Default Browser	Android 3.1-DXKH3

Expressions

Expressions compute chart data. A chart has three axes (x, y, and z), which are called category, series, and values, respectively. For values, you can specify an expression that lets you select how and what data should appear. For category and series, you can specify only a column name.

Syntax

This is the syntax for an expression:

```
expr = operand (operator operand)?

operand = column_name | function_name(arg [,arg[,arg…]]) | constant

operator = ( + | / | - | * ) | logical_operator

logical_operator: ( < | > | <= | >= | != | == )

arg = column_name | constant | expr

constant = string | numerical_value
```

- Always enclose string constants in single quotes; using double quotes in the same capacity generates an error.
- Column names are case-sensitive; however, function names are case-insensitive.
- Certain operators, such as > and < , must use HTML syntax (for example, `< >`) when entered manually in the metafile.

Examples of Expressions

```
ValueExpr = Col1+Col2*Col3+2.2   ( ColX == e.g. column name from a database table )
ValueExpr = 'Foo' + Col1         ( will convert whatever is in Col1 to string and concatenate )
ValueExpr = sqrt(Col2)           ( Square root of each value on each row )
```

When combining operands of different types, no implicit conversion is performed, except in some very special cases.

This example is invalid because the "a" and "hello" are of different datatypes, which could potentially create a column of mixed types:

```
    ValueExpr = if(a==1,a,'hello')
```

This is the correct way to write the expression:

```
    ValueExpr = if(a==1,string(a),'hello')
```

Implicit conversions are performed only when columns or constants are concatenated.

There is a special function for specifying dates as constants:

```
    ValueExpr = if( SomeColOfDateType > date(2010,9,1), a, b )
```

However, if you specify a date as a string according to the mask YYYY-MM-DD, it is converted to a date object (for example, "2009-09-01"). Sybase® recommends that you use the **date()** method as described here.

You can nest if-statements; however, too many nesting levels may be difficult to read:

```
    ValueExpr = if( a>b, if( a>c, a, c), b )

    ValueExpr = if (a >b, if (a>c, a, if(a>d, e, f), g ), h ) // you get the picture
```

Expression Types

Each chart has this syntax:

```
<Category Column=”” ../>
<Series Column=”” … />
<Values><Value Expression=”” …/></Values>
```

For example, an application has a table you want to include in a column chart. You must map the values from the table to the chart. To do this, use XML as described above.

The values you want to show in a chart are shown below—three columns of different height.

Project_Group	Members
Alpha	20
Beta	30
Gamma	55

To show these values in the chart, you must specify the category, in this case, “Project_Group.” The category becomes the x-axis. The series is set to empty (“”) and the value in the y-axis is “Members.”

The XML snippet looks like this:

```
<Category Column=”Project_Group” …/>
  <Series Column-“” …/>
  <Values>
  <Value Expression=”Members” … />
</Values>
```

There is no value expression per se—the column name is used as a value expression. To specify a real expression, for example, if to add 10% more members, use Expression=”Members*1.10”.

Note: There are a number of runtime functions you can use in expressions. These functions are described later in this document.

Internally, expressions work with columns, so using “Members*1.10” means that every row in the table gets 10% more members. If you have two columns—Column1 and Column2—and you write “Column1 + Column2”, the two columns are added together row by row.

This example takes each row from the Age column and adds 10% to each value, creating a new value array that has the same number of rows:

```
    ValueExpr= Age*1.1
```

The following example calculates the sales revenue of a company.

```
    ValueExpr=Amount*(UnitPrice–UnitCost)
```

Under normal circumstances, developers do not interact directly with the parser and lexer. Instead, they specify the value expressions in a middle layer.

Runtime Functions

You can use runtime functions in expressions; however, make sure you use the correct type of function on the correct datatype. For example, do not use `Abs` (Name) if Name is a column containing strings.

Note: Column names are case-sensitive, but function names are not.

Numeric Functions

```
//
// argument is a constant/column name
//
```

Function Name	Description
Abs(column)	Abs(-1) -> 1, Abs(col) does |col| on all values.
Ceiling(column)	Ceiling(1.01)->2.0
Cos(column)	Cos(1)->0.9998477
Exp(column)	Log(Exp(2)) == 2
Fact(column)	5!->120, be careful with overflow.
Floor(column)	10.1 -> 10.0
Int(column)	12.2 -> 12, use round for rounding values.
Log(column)	Log(Exp(1))=1
LogTen(column)	LogTen(10*10)==2
Mod(column, dividend)	10%5 == 0, 3%2 == 1
Neg(column)	Neg(-1)->1,Neg(1)->-1 Note: Neg differs from Abs. Use Neg when a negative value is needed, since unary minus is not supported. For example, 2*-1 is not allowed; instead write 2*Neg(1).
Round(column,decimals)	Rounds off a value to decimals. The second argument "decimals" can only be a constant and cannot be a column name.
Sign(column)	Sign(1.0)->1,Sign(-121)->-1
Sin(column)	Sin(1)->0.01745241
Sqrt(column)	Sqrt(3)->1.7320508…
Tan(column)	Tan(1)->0.01745506
Truncate(column)	12.32123->12.

DateTime Functions

```
//
// date time functions only work on columns(vectors) of type date, in general it is
// not possible to use them on constant values since there is no date type recognized
// in the parser.
// e.g. not allowed: Day( "2010-05-10" ) allowed: Day( MyDateCol )
// (you can however use the date function for date constants, see below)
```

Function Name	Description
Date(y,m,d[,hh,m,s] | column)	This versatile function can create a constant by using constant values for year, month, and so on, or converting a datetime column to a date datatype. For example, date(2010,9,1) creates a constant date that can be used in expressions and date(mydatecol) removes hh:mm:ss from the datetime in the column. This may be when comparing datetimes when the time of day does not matter.
Day(column)	Returns the day number 1 – 31/30/28.
DayNumber(column)	1=Sunday, 2=Monday,…
Hour(column)	Returns hour of day.
Minute(column)	Returns minute of hour.
Month(column)	Returns month of date.
RelativeDate(column, days)	Adds days to date, days== constant value, cannot be a column name.
RelativeTime(column, seconds)	Adds seconds to date timestamp== constant value, cannot be a column name.
Second(column)	Returns seconds, column is assumed to contain date objects.
Year(column)	Returns year of date; column is assumed to contain date objects.

String Functions

```
//
// functions operate on columns if not stated otherwise
//
```

Function Name	Description
Left(column, numberOfChars)	left(‘abcdef’,3)->’abc’, left(Column1,1)
LeftTrim(column)	‘ abc ‘ -> ‘abc ‘
Len(column)	Returns number of characters
Lower(column)	‘MYSTRING’ -> ’mystring’
Match(column, string)	Returns 1 for match, 0 for no match
Mid(column, start [, length])	mid(‘abcdef’,3,2)->’cd’
Pos(column, string [, startPos])	pos(‘abcdef’,’c’)->3
Replace(column, startPos, numberOfChars, string)	“1234” -> “1XX4”. startPos =1,…
Right(column, numberOfChars)	right(‘abcdef’,3)->’def’
RightTrim(column)	‘ abc ‘ -> ‘ abc‘
String(column)	Converts the column to strings
Trim(column)	‘ hello ‘ -> ‘hello’
Upper(column)	‘mystring’ -> ‘MYSTRING’

WordCap(column)	'bob alice eve' -> 'Bob Alice Eve'

Miscellaneous Functions

Function Name	Description
if(condition,expr1,expr2)	If 'condition' is nonzero, expr1 is evaluated; if zero, expr2 is evaluated.
and(expr1,expr2[,…])	This can, for example, be used in an if statement in this way: if(and(expr1,expr2),res1,res2).
or(expr1,expr2[,…])	As above.
not(expr1==expr2)	unary not(expr1==expr2) is the same as expr1!=expr2.

Metadata File

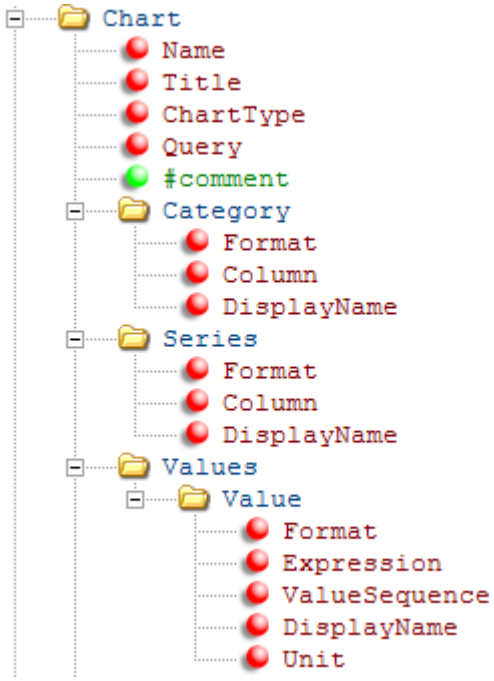
The metadata file is a configuration file for MAKit that contains information about chart, variables, and the interdependencies between charts. The metadata file also connects charts to queries.

The format of the metadata file must be a well-defined XML file.

Note*:* All node names and attribute names have a capitalized first letter.

Chart

The `Chart` node is the root node for the metadata. It contains the description of a chart.



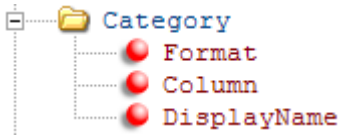
The `Chart` node contains a `Name`, an optional `Title` for the chart, and a `ChartType` , for example, BAR.

Supported chart types include: BAR, COLUMN, LINE, PIE, and BUBBLE.

`Query` is a named query, for example, "RevenueByYear," that resides in the application and is called by MAKit to retrieve chart data. The application uses the `Query` to retrieve data from the appropriate datasource and feed it back to MAKit.

There are a number of nodes under `Chart:`

Category

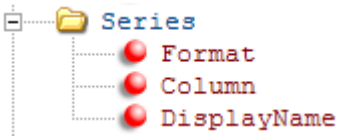


The `Category` column contains the category; typically the x-axis in an xy-chart. `Column` is the actual unique name of the column to use for the `category`. The `Format` attribute lets you modify the data format; for example, `Format="WeekDay"` converts the date to a weekday name in the chart. `DisplayName` can be any text to describe this category. Both `Format` and `DisplayName` are optional.

Supported Format Strings

Name	Type Req	Description
Month	DateTime	For example, "January"
ShortMonth	DateTime	For example, "Jan"
WeekDay	DateTime	For example, "Monday"
ShortWeekDay	DateTime	For example, "Mon"
ShortDate	DateTime	Depends on locale
LongDate	DateTime	Depends on locale
Currency	Number	Depends on locale, for example, $10.20
Percent	Number	Displays as percent, for example, 10 -> 10%
Rounded{n} (n = 0, 1, 2, .. 9 }	Number	Rounds number to n decimals

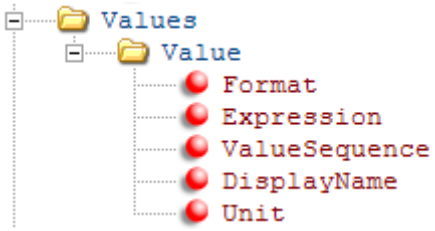
Series



`Series` specifies the z-axis. However, since the charts are two-dimensional, series are drawn next to each other. An example is a table that shows the number of employees year for year (category) where gender is the series, and the number of employees is the value.

`Column` is the actual unique name of the column to use for `Series`. The `Format` attribute (optional) lets you modify the data format; for example, `Format="WeekDay"` converts the date to a weekday name in the chart. See "Supported Format Strings" on page 34 for supported format types. `DisplayName` (optional) can be any text to describe this series.

Values



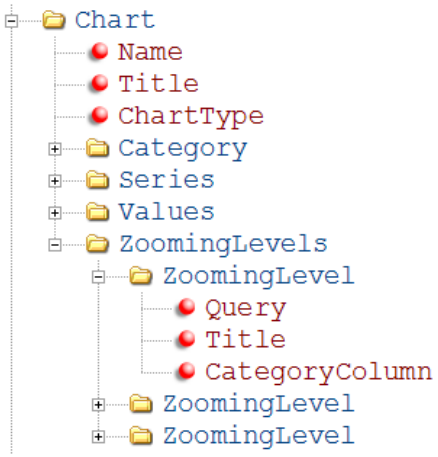
The **Values** node contains one or more **Value** nodes. The **Value** expression shows the values in the chart. Values can optionally use an expression instead of a column name, for example, **Expression**="Amount*1.1" **DisplayName**="Added 10% to price".

The **Format** attribute lets you modify the data format; for example, Format="Currency" converts the amount to currency in the chart. See "Supported Format Strings" on page 34 for supported format types. **DisplayName** can be any text to describe this series.

Typically, a chart uses only one value expression; however, certain chart types may use multiple expressions. The **Values** collection groups such variables together so that other chart types can be supported in future releases.

Semantic Zooming

Semantic zooming allows the chart to display data in several zooming levels, for example, by year, quarter, and month. Chart metadata must include a definition for each zooming level.



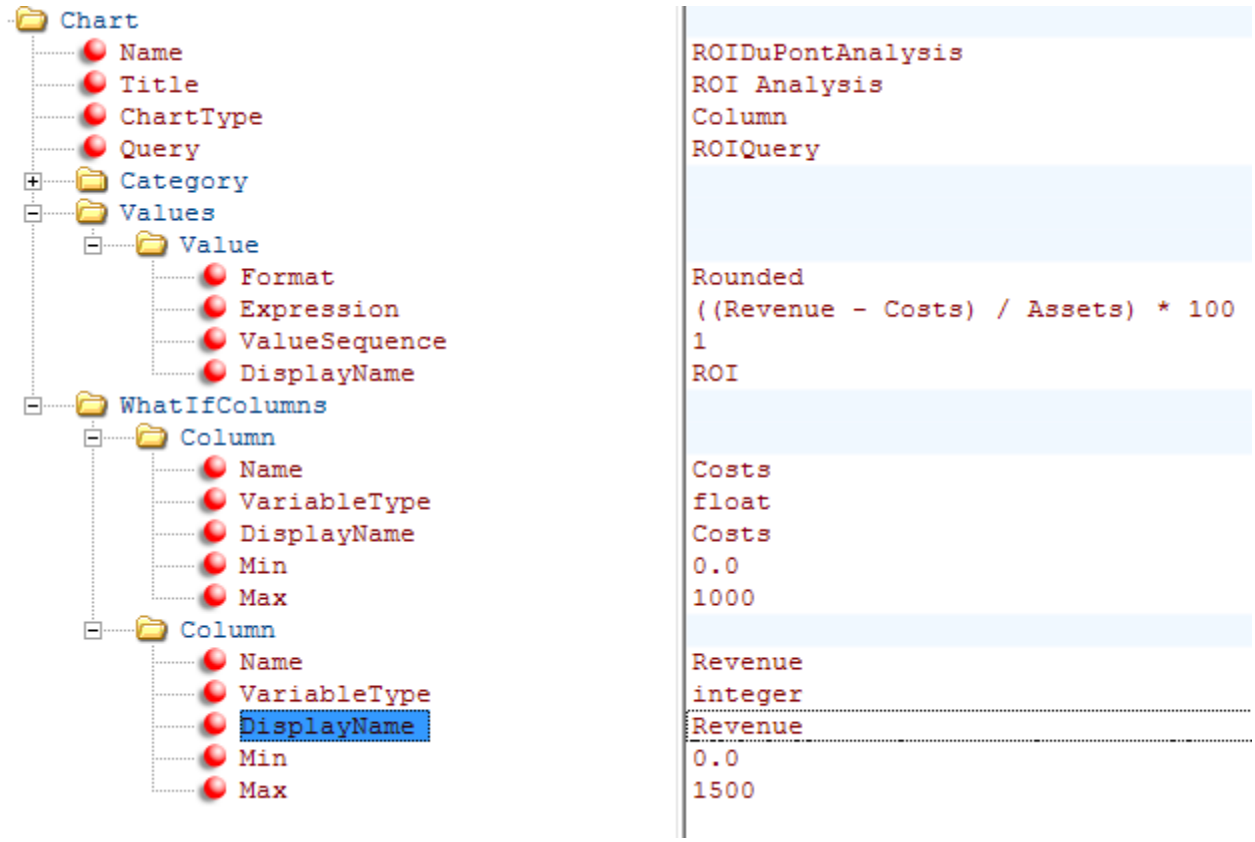
Each zooming level definition includes:

- **Query** – the query name for retrieving data of this level.
- **Title** – optional title for this level.
- **CategoryColumn** – the category column for this level.

Unlike nonzooming charts, semantic zooming charts have different query and category columns in each level. Therefore, the **Query** attribute for the **Chart** node and the **Column** attribute for the **Category** node should be removed.

What-If Analysis

What-if analysis allows the user to dynamically change input data and see instant updates in the chart. To enable this feature, the user must define what-if columns in the chart.



The metadata of this chart is:

```
<Chart Name="ROIDuPontAnalysis" Title= "ROI Analysis" ChartType="Column" Query="ROIQuery" >

    <Category Format="" Column="Year" DisplayName="Year" />

    <Values>

        <Value Format="Rounded" Expression="((Revenue - Costs) / Assets) * 100" ValueSequence="1"
DisplayName="ROI" />

    </Values>

    <WhatIfColumns>

        <Column Name="Costs" VariableType="float" DisplayName="Costs" Min="0.0"  Max = "1000"/>

        <Column Name="Revenue" VariableType="integer" DisplayName="Revenue" Min="0.0" Max = "1500"/>

    </WhatIfColumns>

</Chart>
```

The Values expression is "((Revenue - Costs) / Assets) * 100", which means that the calculation involves three columns from the input table: Revenue, Costs, and Assets. The user can select any of these columns for what-if analysis.

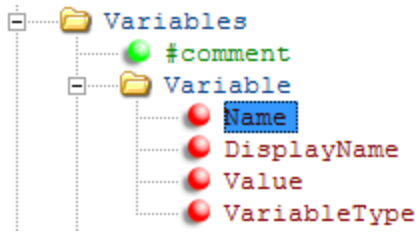
For each what-if column, provide these attributes:

- **Name** – the column name.
- **VariableType** – the datatype of that column. Different datatypes are presented as different controls in the UI. MAKit supports float and integer types.

- **DisplayName** – a text description of the variable. This text appears to the end user in the UI.
- **Min** – the minimum value of the data range.
- **Max** – the maximum value of the data range.

Variables

In MAKit for HTML5, you can define global variables in a separate file. The format of the variable file must be a well-defined XML file. When you load this file into MAKit, you can then use the global variables in the value expression of the chart.



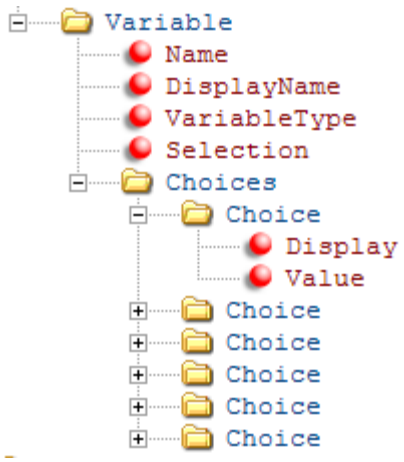
Variable contains a name, an optional description, a variable type and, depending on the type, an optional value. MAKit supports boolean, integer, float, date, and enum variable types.

This is an example of a variable definition:

```
<Variables>
        <Variable Name="$testbool" DisplayName="Test Bool" VariableType="boolean" Value="0" />
        <Variable Name="$basevalue" DisplayName="Test Integer" VariableType="integer" Value="50000" Min="0"
Max="100000" />
        <Variable Name="$testinteger" DisplayName="Test description" VariableType="integer" Value="0" Min="0"
Max="100" />
        <Variable Name="$testfloat" DisplayName="Test description" VariableType="float" Value="20000.0" Min="0.0"
Max="50000" Step="0.5" Decimals="2" />
        <Variable Name="$testdate" DisplayName="Test date" VariableType="date" Value="2010-03-22" />
         <Variable Name="$testenum" DisplayName="Investment priority on" VariableType="enum" Selection="1">
                <Choices>
                        <Choice Display="n/a" Value="n/a" />
                        <Choice Display="Web Ads" Value="Web Ads" />
                        <Choice Display="TV Ads" Value="TV Ads" />
                        <Choice Display="'Newspaper Ads'" Value="'Newspaper Ads'" />
                        <Choice Display="'Road Shows'" Value="'Road Shows'" />
                        <Choice Display="'Conventions'" Value="'Conventions'" />
                </Choices>
        </Variable>
</Variables>
```

Each variable uses one or more of these attributes:

- **Name** – the identity of a variable. The variable name must start with $, be defined, and be unique in a chart.
- **VariableType** – the value type of the variable (required). Supported variable types are: `integer`, `float`, `boolean`, `date`, `enum`.
- **Min** – the minimal value of the variable; applicable to `integer` and `date` variables.
- **Max** – the maximum value of the variable; applicable to `float`, `integer`, and `date` variables.
- **Value** – the default value of the variable. Every variable except `enum` must have a default value. `enum` has an attribute called **Selection**, which is a list of values that can be selected from.
- Boolean variable values – these values indicate "true": true, True, TRUE, yes, Yes, YES, 1. These values indicate "false": false, False, FALSE, no, No, NO, 0.
- Date variable values must be specified with a date statement using the form "date(yyyy, mm, dd)"; for example, "date(2000,12,30)".
- **Description** – a text string that describes the variable (required). This string appears along with the control.

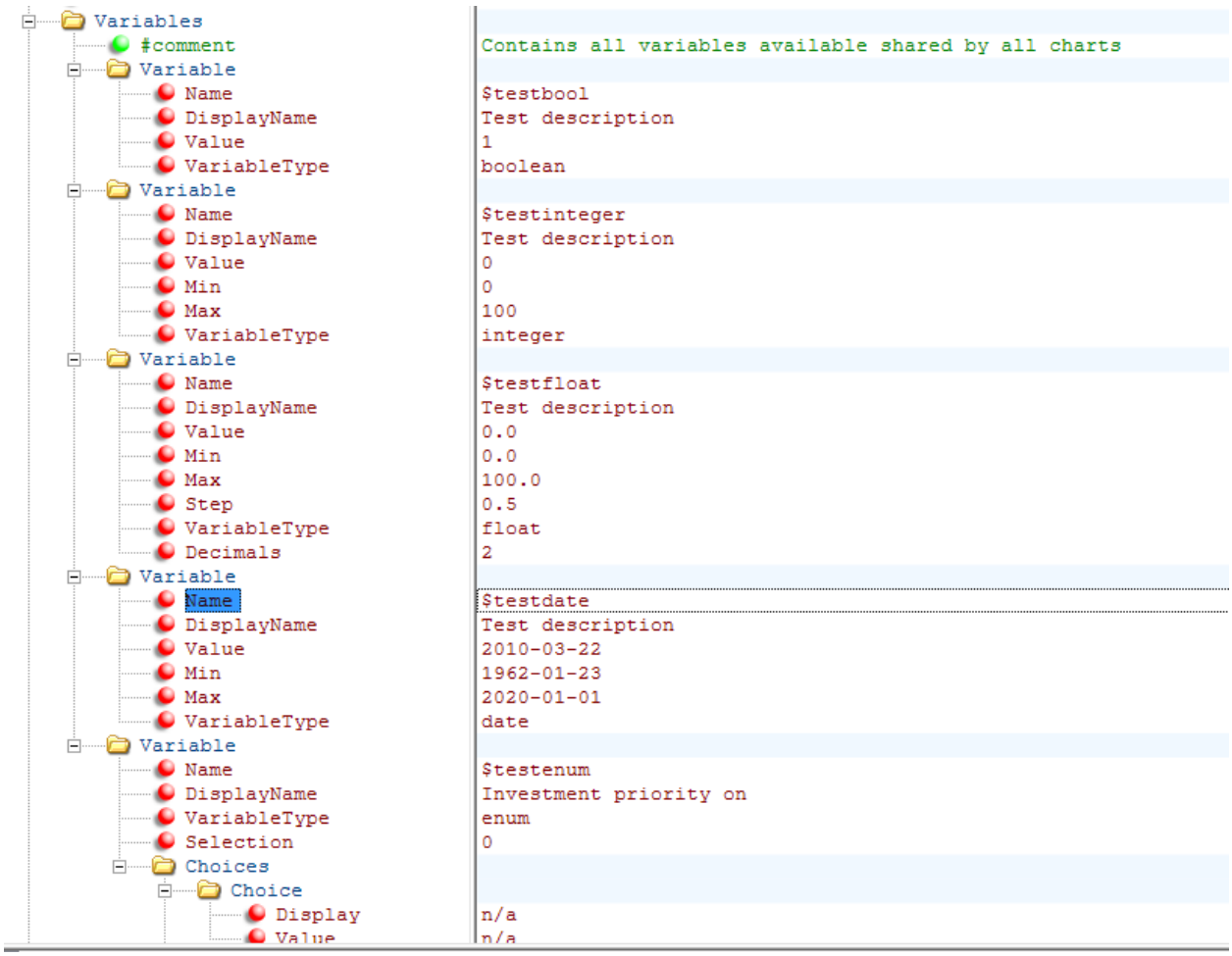


The **Display** attribute contains a text string that is shown to the user, and **Value** is the value used in the value expression.

```
<Variable Name="$shown_region" Type="enum" Selection="0" DisplayName="Show data in region">
    <Choices>
            <Choice Display="North America" Value="North America"/>
            <Choice Display="Asia Pacific" Value="APC"/>
            <Choice Display="Europe" Value="Europe"/>
            <Choice Display="Africa" Value="Africa/">
            <Choice Display="South America" Value="South America"/>
    </Choices>
</Variable>
```

An enum variable allows the user to pick one string value from a collection of strings, which are stored in the **Choices** section. Each choice has a **Value** attribute and a **Display** attribute. If the **Display** attribute is defined, it is used; otherwise, the **Value** is used directly.

There can be an arbitrary number of variables. Each variable type has its own set of attributes as shown below:



Here is an example of the variable usage

```
<Chart Name="chart_1" ChartType="column" Query="year_qty_margin" Title="Revenue By Year">
        <Category Column="Year"/>
        <Values>
                <Value Expression="if(Probality < $basevalue, Probality, 0)" DisplayName="Revenue" Format="currency"/>
        </Values>
</Chart>
```

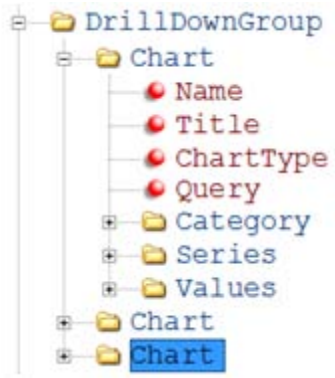
The **Chart** node shows the amount of sales opportunities in each stage. The chart uses a variable (`$basevalue`), which allows the user to show opportunities that have a probability larger than a threshold only. The chart allows the user to adjust this threshold, by means of a slider control.

DrillDownGroup

Use **DrillDownGroup** to create a link between charts, for example, when something like a category is picked in the first chart, and it affects what to show in the next chart. The selected category is passed as a parameter to the query of the next chart.

The `Name` of the drilldown group is used for the layout, which is then applied on all charts in the group. This rule applies to all collections (groups).

A drilldown group contains multiple chart nodes. Each chart node defines the chart of a drilldown level.



Themes

MAKit provides three themes: default, green, and blue. Users can customize additional themes.

The MAKit default theme includes these `css/image` files:

- `WebContent/css/default.css` – chart styles.
- `WebContent/css/digitpicker.css` – digitpicker Web control styles.
- `WebContent/images/` – all images used by `default.css` and `digitpicker.css`.
- `WebContent/css/jquery/*.css` – all jQuery-related styles.

The "blue" and "green" themes are located in `WebContent/demo_debug/css/themes`.

These themes override the default chart, JavaScript control, and page styles.

Using a Static Theme

Users can add static link references in the page header to specify a theme; for example to use the blue theme:

1. Add the css file reference in the page, for example:

```
<link rel="stylesheet" type="text/css" class="ui-theme" href="css/blue.css">
```

2. Load the chart style on the page's onload event:

```
$MA.Chart.getStyles();
```

Using a Dynamic Theme

Users can use specify a theme in JavaScript. For example, users can use a theme in a button click.

Use the green theme by calling the function **updateCSS** defined in `layout.js`.

```
updateCSS('green',function(success,link)
{
        if (success)
        {
           $MA.Chart.getStyles();
           $MA("chart_1").applyCSS();//apply the theme to chart
        }
});
```

User-Defined Theme for Chart

Users can override the chart theme by defining a new chart palette.

1. Define a new palette for the chart:

```
var blueDeepOrangePalette = [
```

```
  0x2895c9,
  0x64b2dd,
  0xa8cfe5,
  0xc9e4f3,
  0xdcce9f,
  0xe1af48,
  0xe99f20,
0xdb7e2a];
```

2. Apply the new palette to the chart:

```
$MA.Chart.setPalette(blueDeepOrangePalette);
 $MA("chart_1").refresh();
```

Theme Definition

This section introduces Web controls and theme definitions for graphs.

Page

```
body {
        margin: 0;
        font-family: Helvetica;
}
```

Web Controls

DatePicker

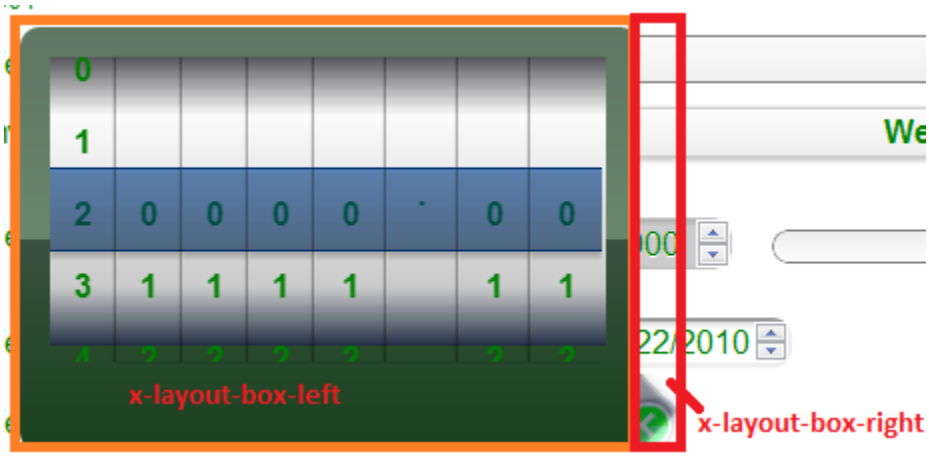
```
.ui-datepicker {   //background
background: #d3eb77;
}
.ui-datepicker td a{  //date color
color:green;
}
```

```
.ui-datepicker-title { //title color
 color:green;
}

.ui-datepicker-date-input {//the input text color
        color:green;
}
```

Slider

```
a.ui-btn-up-b{ //color for button up
 background-image:-webkit-linear-gradient(top,#659C7E,#39A54D);
 background-color:green;
}
a.ui-btn-hover-b {// color for button hover
        background:                    #58C85E !important;
        background-image: -webkit-linear-gradient(top, #7AC389, #58C85E) !important;
}
a.ui-btn-down-b {//color for button down
        background:                    #6BC26D;
        background-image: -webkit-linear-gradient(top, #4D985D, #6BC26D);
 }
.ui-body-c select{//color for button selected
        color:green;
}
```

DigitPicker



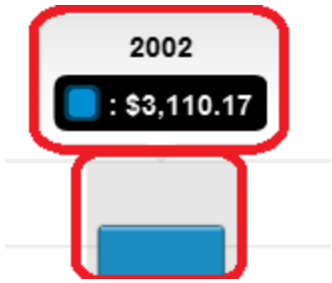

```
#MADigitPickerControl div.x-layout-box-left {
background: -webkit-gradient(linear, left top, left bottom, from(rgb(96,118,98)), to(rgb(24,65,28)), color-stop(0.5, rgb(105,134,108)), color-stop(0.5, rgb(58,81,62)));
}

label.digitpicker-value{
color:green;
}
a.digitpicker-button{
        background:transparent url("digitpicker-button-green.png") no-repeat center;
}
```

Chart

```
.chart {
        background:#FFFFFF;
}
```

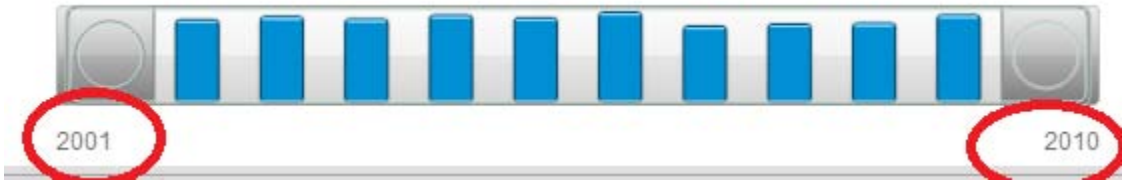
Slider

```
.chart_value_bubble {// The background and foreground for bubble text

        background: #000000;
        color: #FFFFFF;
}
```



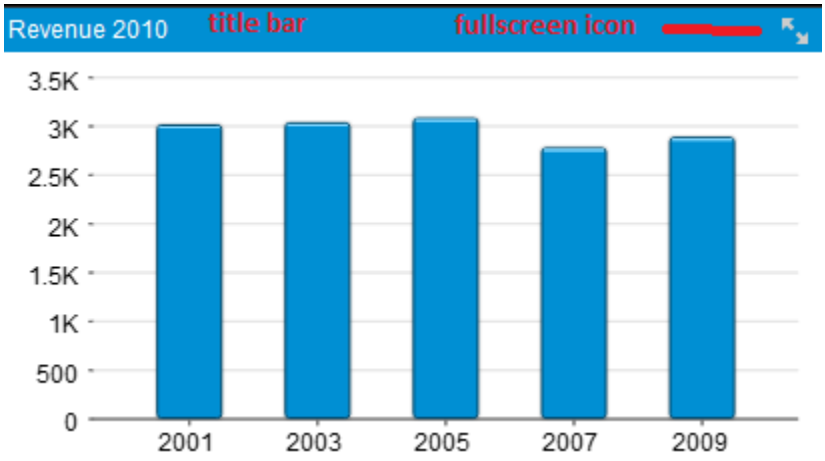

```
.chart_value_bubble_outline
{
        background: rgba(128, 128, 128, 0.2);
        color:#808080;
}
```

Range Selector




```
.chart_range_selector_text {// the text for range selector
        font-size: 12px;
        font-family:Helvetica;
        color:#707070;
}
```

Titlebar




```
.chart_titlebar {
        background: #008FD3
```

```
}

.chart_titlebar > .fullscreen_icon {
        margin-top: 5px;
        background: url(images/fullscreen_icon.png) no-repeat;
        cursor:pointer;
}
```

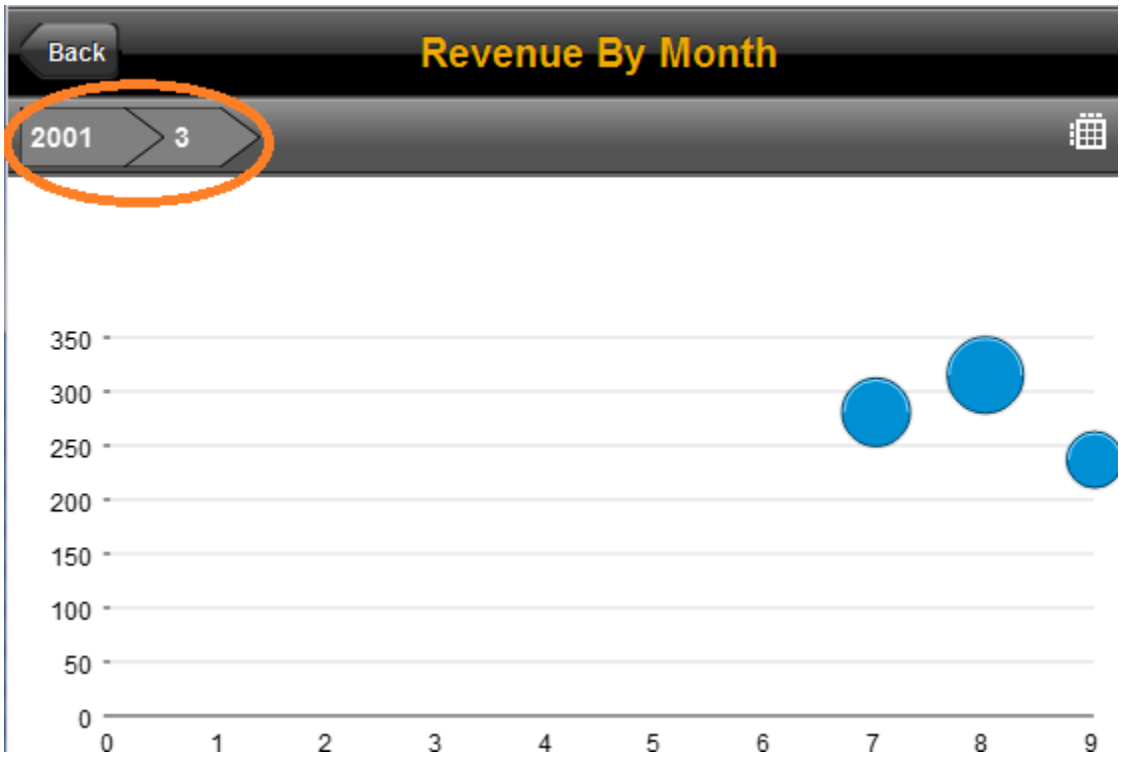
Toolbar

```
.chart_toolbar {
        box-sizing: border-box;
        -moz-box-sizing: border-box;
        border-bottom: 1px solid #666666;
        border-top: 1px solid #666666;
        background: url(images/chartToolbar.png) #666666 repeat-x;
}

.chart_toolbar > .chart_button {  //button on toolbar
        border: 3px;
        background: #222222;
        -moz-border-radius:6px;
        -webkit-border-radius:6px;
        border-radius:6px;
        font-family: inherit;
        font-size: 12px;
        font-weight: bold;
        color: #fff;
}

.chart_toolbar  > .chart_button:hover {
  background: #333333;
  color: #ccc;
}

.chart_toolbar  > .chart_button:active {
  background: #666666;
```

```
}

.chart_toolbar > .table_button { //table button
        border: 0px;
        background: url(images/table_icon.png) no-repeat;
}

.chart_toolbar > .rangeselector_button {//rangeselector button
        border: 0px;
        background: url(images/rangeselector_icon.png) no-repeat;
}

.chart_toolbar > .share_button {//share button
        border: 0px;
        background: url(images/e-mail_icon.png) no-repeat;
}

.chart_toolbar > .whatif_button {//whatif button
        border: 0px;
        background: url(images/whatif_icon.png) no-repeat;
}

.chart_toolbar > .da_button {//da button
        border: 0px;
        background: url(images/da_icon.png) no-repeat;
}

.chart_toolbar h1 {//title on toolbar
        overflow: hidden;
        margin:auto;
        font-size: 20px;
        font-weight: bold;
        text-shadow: rgba(0, 0, 0, 0.4) 0px -1px 0;
        text-overflow: ellipsis;
        white-space: nowrap;
        color: #F0AB00;
        display:inline;
}
```

Breadcrumbs

Breadcrumbs are buttons that identify the selections that have been made in a drilldown chart.




```
.chart_breadcrumbs {
  background: #808080;
  color: #FFFFFF;
}
```

Table

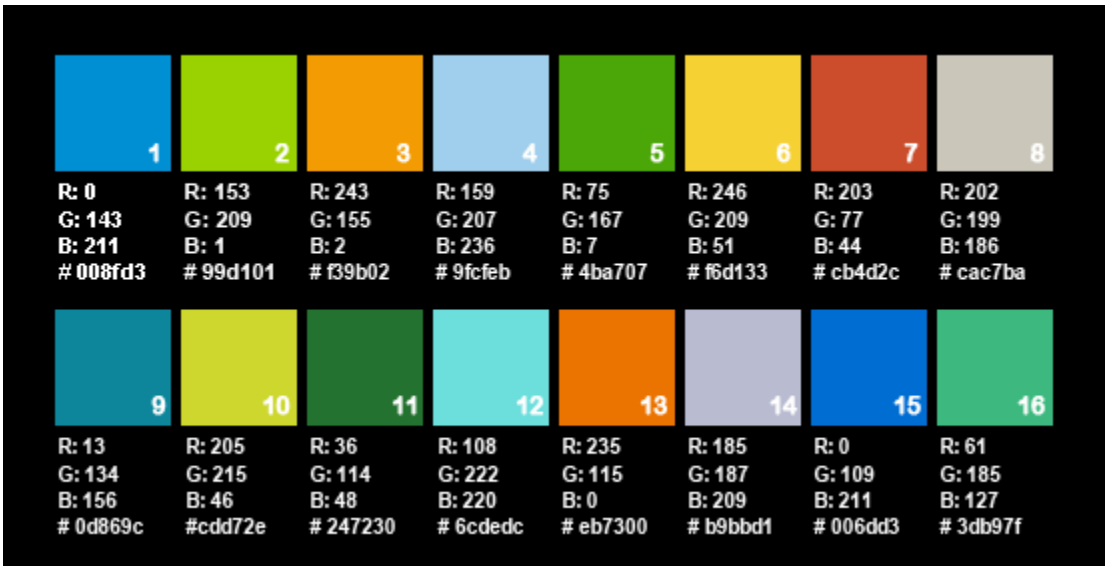
year	revenue
2001	$3,000.61
2002	$3,110.17

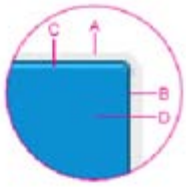
```
.chart_table {//general style
        background:#FFFFFF;
        font-size: 14px;
        font-family:Helvetica;
        color:#000000;
}

.chart_table_dimension_title {//dimension title
        background:#DDDDDD;
```

```
}

.chart_table_row_header {//row header
        background:#DDDDDD;
}

.chart_table_column_headers {//column header
        background:#F7F7F7;
}

.chart_table_contents {// contents
        background:#F7F7F7;
}
```

Graph

The default theme uses the SAP® mobile palette, which includes 16 colors. Using themes other than the default overrides this palette. This section, however, uses the default theme to show how to define a graph theme.





A – Outline: Outline 3px opacity 0.1; border radius: 5px

B – defaultStrokePalette: Border 1px; border radius: 2px

C – defaultInsetShadowPalette: Inset shadow 0 1px 0

D – defaultFillPalette: Fill color

A – Outline

```
It’s a const value: rgba(0, 0, 0, 0.1).
```

B – defaultStrokePalette

```
.defaultStrokePalette{
}
.defaultStrokePalette  .color1{
        color: #00486A;
}
.defaultStrokePalette  .color2{
        color: #4C6800;
}
.defaultStrokePalette  .color3{
        color: #794D01;
}
.defaultStrokePalette  .color4{
        color: #506876;
}
.defaultStrokePalette  .color5{
        color: #255303;
}
.defaultStrokePalette  .color6{
        color: #7BCC19;
}
.defaultStrokePalette  .color7{
        color: #662716;
}
.defaultStrokePalette  .color8{
        color: #65645D;
}
.defaultStrokePalette  .color9{
        color: #06434E;
}
.defaultStrokePalette  .color10{
        color: #666B17;
}
.defaultStrokePalette  .color11{
        color: #123918;
}
.defaultStrokePalette  .color12{
        color: #366F6E;
}
```

```
.defaultStrokePalette  .color13{
        color: #763A00;
}
.defaultStrokePalette  .color14{
        color: #5C5D68;
}
.defaultStrokePalette  .color15{
        color: #00376A;
}
.defaultStrokePalette  .color16{
        color: #1F5D40;
}
```

C – defaultInsetShadowPalette

```
.defaultInsetShadowPalette{
}
.defaultInsetShadowPalette  .color1{
        color: #80D6FF;
}
.defaultInsetShadowPalette  .color2{
        color: #D3FF80;
}
.defaultInsetShadowPalette  .color3{
        color: #FFD180;
}
.defaultInsetShadowPalette  .color4{
        color: #D6F0FF;
}
.defaultInsetShadowPalette  .color5{
        color: #B9FF85;
}
.defaultInsetShadowPalette  .color6{
        color: #FFEB99;
}
.defaultInsetShadowPalette  .color7{
        color: #FFB09B;
}
.defaultInsetShadowPalette  .color8{
        color: #FFFEF5;
}
.defaultInsetShadowPalette  .color9{
        color: #89EDFF;
}
```

```
.defaultInsetShadowPalette  .color10{
        color: #F9FF9B;
}
.defaultInsetShadowPalette  .color11{
        color: #A8FFB5;
}
.defaultInsetShadowPalette  .color12{
        color: #BEFFFE;
}
.defaultInsetShadowPalette  .color13{
        color: #FFBE80;
}
.defaultInsetShadowPalette  .color14{
        color: #F0F2FF;
}
.defaultInsetShadowPalette  .color15{
        color: #80C1FF;
}
.defaultInsetShadowPalette  .color16{
        color: #AAFFD7;
}
```

D – defaultFillPalette

```
.defaultFillPalette{
}
.defaultFillPalette  .color1{
        color: #008fd3;
}
.defaultFillPalette  .color2{
        color: #99d101;
}
.defaultFillPalette  .color3{
        color: #f39b02;
}
.defaultFillPalette  .color4{
        color: #9fcfeb;
}
.defaultFillPalette  .color5{
        color: #4ba707;
}
.defaultFillPalette  .color6{
        color: #f6d133;
}
```

```
.defaultFillPalette  .color7{
            color: #cb4c2d;
}
.defaultFillPalette  .color8{
            color: #cac7ba;
}
.defaultFillPalette  .color9{
            color: #0d869c;
}
.defaultFillPalette  .color10{
            color: #cdd72e;
}
.defaultFillPalette  .color11{
            color: #247230;
}
.defaultFillPalette  .color12{
            color: #6CDEDC;
}
.defaultFillPalette  .color13{
            color: #EB7300;
}
.defaultFillPalette  .color14{
            color: #B9BBD1;
}
.defaultFillPalette  .color15{
            color: #006DD3;
}
.defaultFillPalette  .color16{
            color: #3DB97F;
}
```

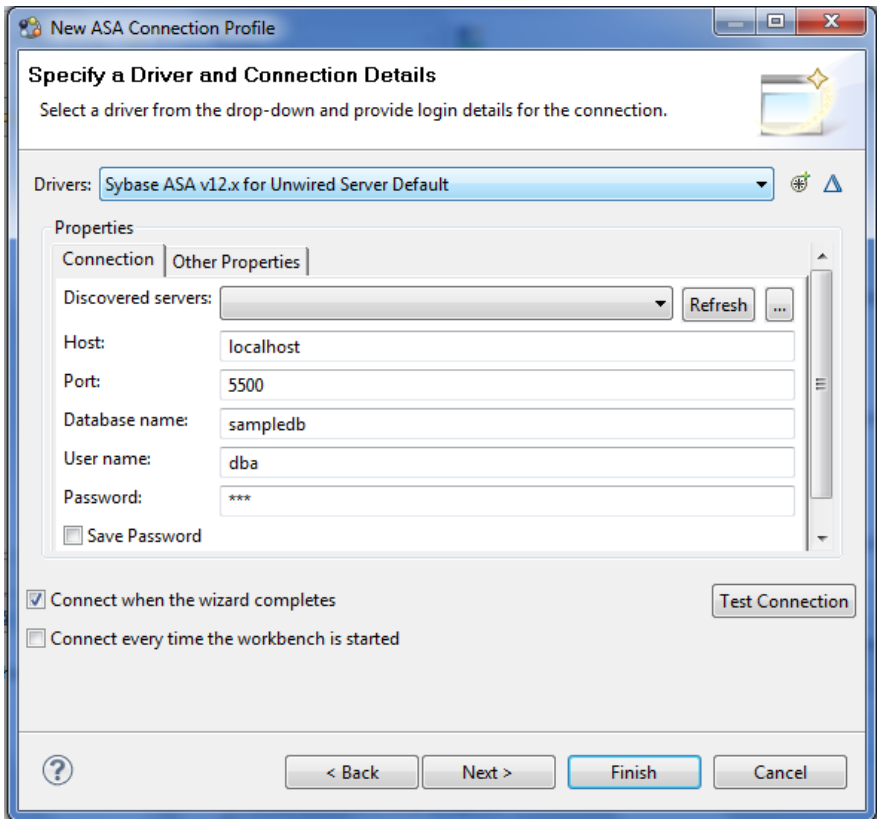
Using MAKit in Unwired Platform Hybrid Web Container

This section discusses how to create charts using MAKit HTML 5 within a Sybase Unwired Platform Hybrid Web Container. The example creates an Unwired Platform workflow, which shows several charts using data from an Unwired Server. First, we will create several tables in the default database ("sampledb") in which to store the data. Next, we will create mobile business objects (MBOs) to map to the data table from the database. Finally, we will create different types of charts to show the MBOs.

Creating Database Tables Using Unwired WorkSpace

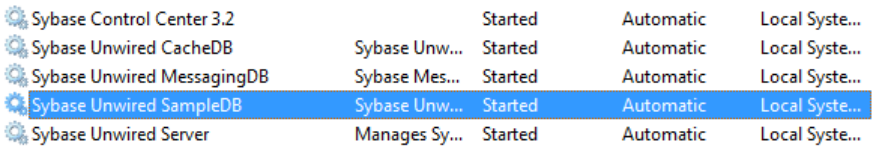
Create a Sample Connection Profile

1. In Enterprise Explorer, right-click the **Database Connection** folder, and select **New** to open the wizard page.
2. Select **Sybase ASA**, enter `sampledb` as the name, then click **Next**.
3. Select **Sybase ASA v12.0 for Unwired Server Default** as the driver and keep all the default settings.



4. Click **Test Connection** to verify the connection works.

   If the test connection fails, verify that the sampledb service is started: In Windows, select **Start > Control Panel > Administrative Tools > Services**.



5. Click **Finish** to complete.

Create Sample Tables

Create a table named "RevenueByY" with this definition:

Primary Key	Column Name	Datatype	Nullable	Default
☐	product	nvarchar(20)	☐	
☐	year	double	☐	
☐	revenue	double	☐	

1. Add sample data to the table:

No.	product [NVARCHAR(20)]	year [DOUBLE]	revenue [DOUBLE]
1	laptop	2005.0	2000.0
2	desktop	2005.0	1500.0
3	tablet	2005.0	1200.0
4	desktop	2006.0	1700.0
5	laptop	2006.0	2300.0
6	tablet	2006.0	1500.0
7	laptop	2007.0	2500.0
8	desktop	2007.0	1800.0
9	tablet	2007.0	1500.0
10	laptop	2008.0	2800.0
11	desktop	2008.0	2000.0
12	tablet	2008.0	1600.0
13	laptop	2009.0	2900.0
14	desktop	2009.0	2100.0
15	tablet	2009.0	2000.0
16	laptop	2010.0	2700.0
17	desktop	2010.0	1900.0
18	tablet	2010.0	2500.0

This shows revenue for 6 years (2005 to 2010). For each year, there are three products (laptop, desktop, tablet).

2. To add all data for table RevenueByY, execute the "SQL Statements for RevenueByY Table," on page 97.
3. To create the two additional tables needed for semantic zooming chart, execute the "SQL Statements for RevenueByQ Table" on page 98 and the "SQL Statements for RevenueByM Table," on page 100.
4. To create the additional table needed for the drilldown chart, execute the "SQL Statements for EmpIncome Table" on page 108.

Creating a New Mobile Application

1. Select **File > New > Mobile Application Project**.
2. Enter demo1 as the name.
3. Click **Finish**.

Creating New MBOs

Create a New MBO for the RevenueByY Table

1. From WorkSpace Navigator, right-click the **demo1** folder, then select **Open in Diagram Editor**.
2. Drag the RevenueByY table to the Mobile Application Diagram painter.
3. Enter RevenueByY as the MBO name.
4. Unselect "create."
5. Click **OK.**

Deploy the MBO

1. From the WorkSpace Navigator, right-click **Mobile Business Objects**, then select **Deploy Project**.
2. Select **Update** as the deployment mode, keep the default name (demo1) as the package name. and then click **Next**.
3. Review the MBO list and click **Next** to continue.
4. Click **Next** again.

5. Choose **My Unwired Server** as the target server, then click **Next** to continue.
6. Click **Next** again.
7. Choose the Server Connection for My Sample Database, and choose **sampleDB**.
8. Click **Finish**.

Note: You can verify whether the MBO was deployed successfully by going to the Enterprise Explorer and selecting **Unwired Server > Domains > default > Packages**. "demo1:1.0" indicates that the MBO has been successfully deployed.

Creating a New Workflow

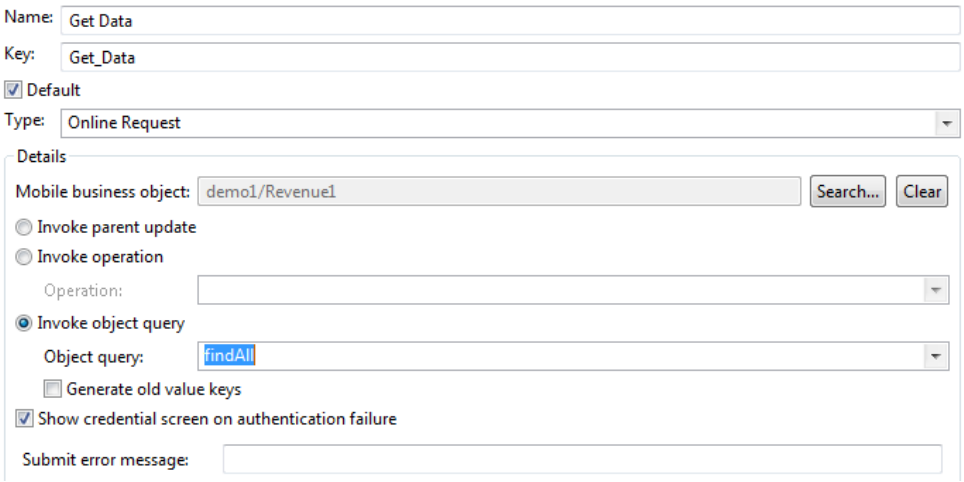
1. Select **File > New > Mobile Workflow Forms Editor**.
2. Choose **demo1 [Version 1.0]** as the parent folder, specify the workflow name as `MyWFDemo.xbw`, then click **Next**.
3. Select **Can be started, on demand from the client**, and leave the other options unselected.
4. Click **Finish**.

Add an MBO to the Workflow

1. Go to the Flow Design page by clicking **Flow Design** tab.
2. In WorkSpace Navigator, select the **demo1** > **Mobile Business Object** folder to show all MBOs.
3. Drag the **RevenueByY** MBO to the workflow form. Two screens are automatically created—RevenueByY, which contains a listview that shows the MBO data, and RevenueByYDetail.
4. Link the start-up screen to the RevenueByY screen, so there is a menu item ("Open Screen RevenueByY") on the start-up screen to be created. At runtime, when this menu item is clicked, the workflow transits to this page.

Add an Action to Retrieve Data from the MBO

1. In the Flow Design tab, double-click **RevenueByY**.
2. Delete the Submit menu item, then add a new menu item named **Get Data**.
3. On the **Get Data** property page:
   - Change the type from "Save Screen" to "Online Request."
   - Verify that the MBO binding to the RevenueByY MBO exists. If it is not, click **Search** button to bind it. In the popup dialog, keep the default values, click **Search**, and then choose **RevenueByY**. Click **OK** to finish.
   - Select **Invoke object query** and unselect "Generate old values keys."
   - In Object Query, select **findAll** to retrieve all data rows.

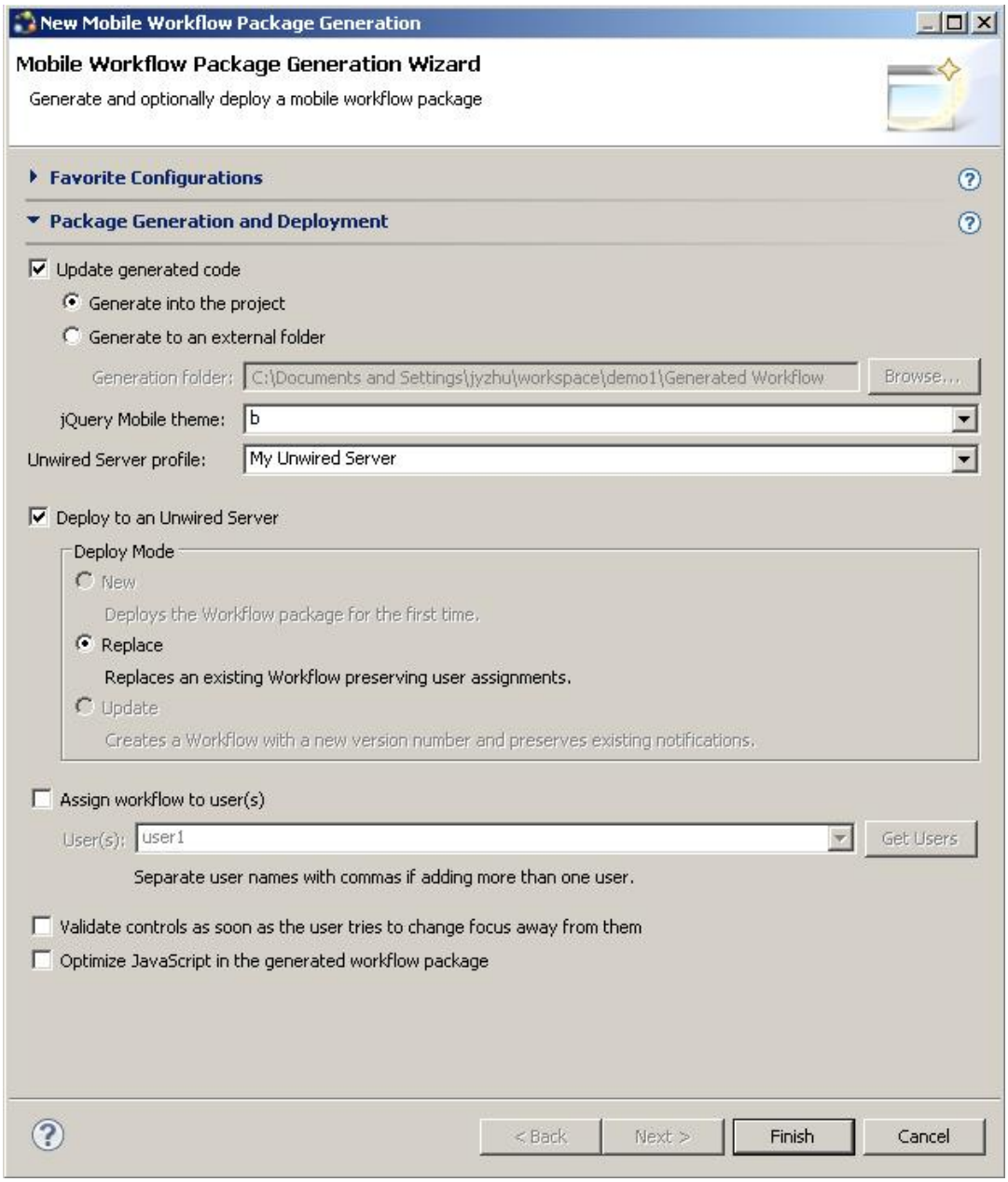


4. Save this screen.

Deploy the Workflow

Right-click the workflow page and select **Generate Mobile Workflow Package**.

1. Leave the default values as shown here:



Note: if this is the first time this workflow has been deployed, specify **New** as the Deploy Mode. Otherwise, specify **Replace**. You can assign this workflow to an existing user on your Unwired Server.

2. Click **Finish**.

   WorkSpace deploys the workflow to the Unwired Server. Verify the deployment by selecting the **Enterprise Explorer** tab > **Unwired Servers** > **My Unwired Server**. In the `WorkFlows` folder, you should see MyWFDemo:1—the newly deployed workflow.

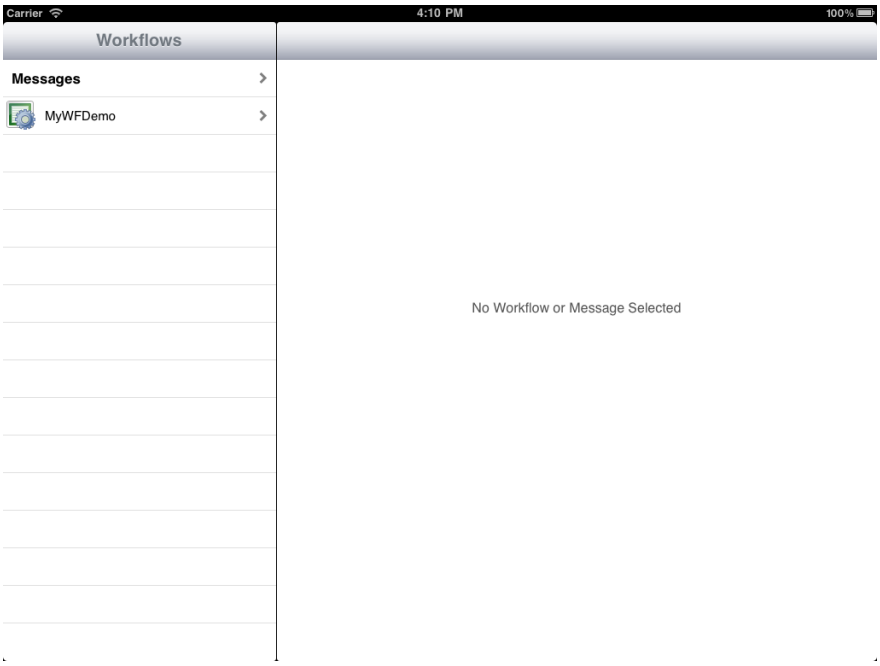
Defining an Application Connection

You must assign your workflow to an application connection so that the container can access your workflow from a device.

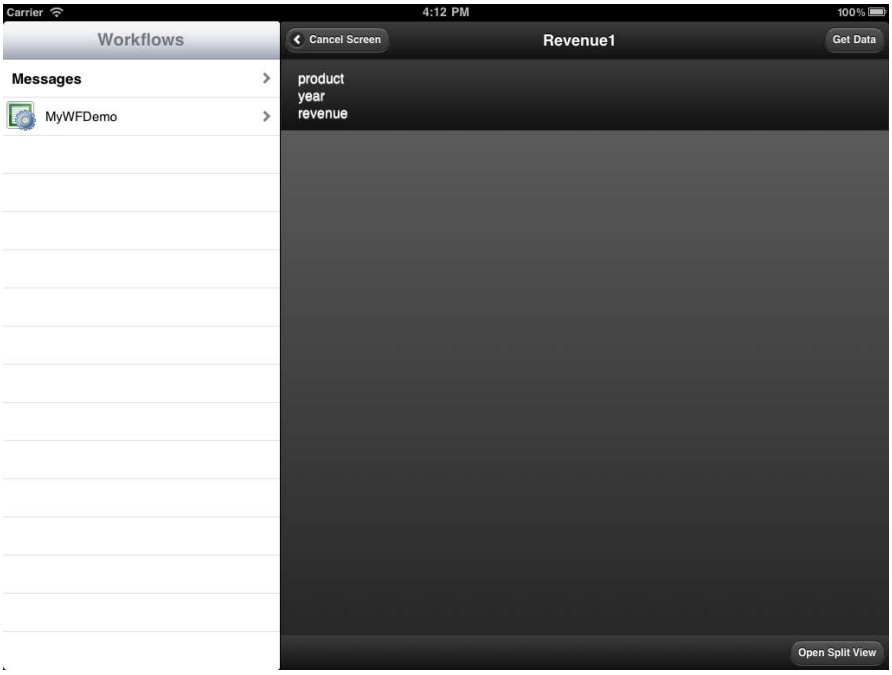
1. Log in to Sybase Control Center. The default user name and password is “supAdmin” and “s3pAdmin”.
2. In the left pane, click **Applications.** In the Application Connection tab, click **register**, and enter this information:
    - User Name – `user1` or any user name you want
    - Template – default
    - Server Name – your_host_name.sybase.com
    - Port – 5001
    - Farm ID – 0
    - Application ID – HWC
    - Security configuration – admin
    - Domain – default
    - Code length – 3
    - Expiration – 72
    - Select **Specify activation code**, and set it to 123 or any string you want
3. In the left pane, click the newly deployed workflow. In the Application Connection tab, click **Assign Workflow**, search for and select the user you just defined, then click **OK** to assign it to the workflow.

   Test the workflow in the container. See *Sybase Unwired Platform version 2.1.2 > Configure the Mobile Workflow Container On the Device* for information about installing the container to the IOS/Android device and configuring the setting.

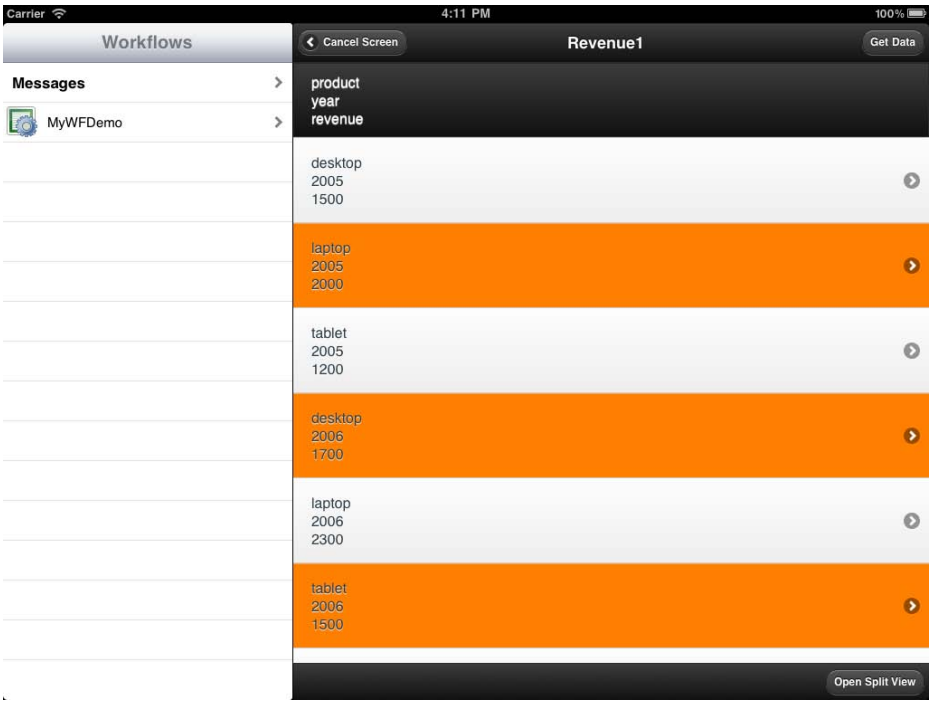
   You should see a workflow named “MyWFDemo” on your iPad simulator.



   Click the workflow to see a screen with a listview:



Click **Get Data** to see the data in the listview:



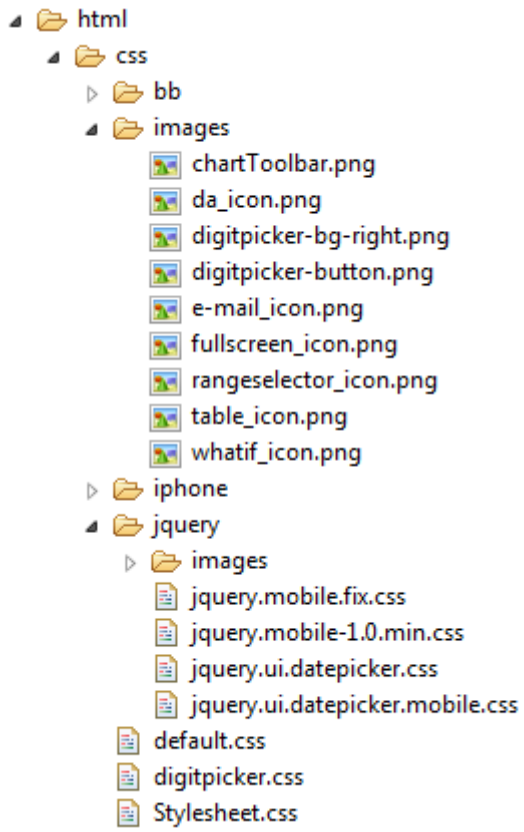
Adding a Simple MAKit Chart to the Workflow

Add MAKit-Related Files to the Project

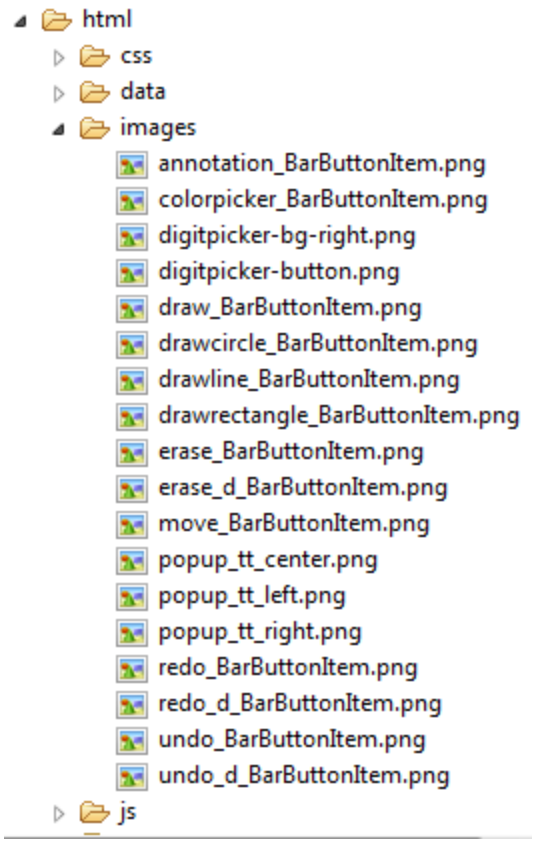
To use MAKit in your workflow, copy the necessary files to your project. These files include css, image, and JavaScript files. The root folder for these files is `<SUP server folder>\UnwiredPlatform\MobileSDK\MAKit\HTML5;` in this task, this folder is called `<Source Root>`. For the workflow created earlier, the generated workflow app folder name should be `demo1/Generated Workflow/MyWFDemo/html`; here, this folder is called `<Target Root>`.

1. Copy all style sheet files from `<Source Root>/css/` to `<Target Root>/css/`:
   - `Default.css`
   - `Digitpicker.css`
2. Copy these image files from `<Source Root>/css/images/` to `<Target Root>/css/images/`:
   - `chartToolbar.png`
   - `da_icon.png`
   - `digitpicker-bg-right.png`
   - `digitpicker-button.png`
   - `e-mail_icon.png`
   - `fullscreen_icon.png`
   - `rangeselector_icon.png`
   - `table_icon.png`
   - `whatif_icon.png`
3. Copy jQuery-related style sheet files from `<Source Root>/css/jquery/` to `<Target Root>/css/jquery/`:
   - `jquery.mobile-1.0.min.css`
   - `jquery.ui.datepicker.css`
   - `jquery.ui.datepicker.mobile.css`

The style sheets and related images should look like:



4. Copy these images from `<Source Root>/images/` to `<Target Root>/images/`:



5. Copy these JavaScript files from `<Source Root>/scripts/` to `<Target Root>/js/`:
   - `Sybase.MAKit-min.js`, the main MAKit library
   - `jquery.ui.datepicker.js`
   - `jquery.ui.datepicker.mobile.js`
   - `jquery.glob.js`
6. Copy the `/locinfo` folder in `<Source Root>` to `<Target Root>/js/`.
7. Add the JavaScript file `MyLayout.js` to the `<Target Root>/js` folder. You can assign any name to this file; we will later add functions that define the screen layout and arrange charts. Add this code to the JavaScript file:

```
//used for defining the layout of normal chart on the screen

arrangeCharts = function(cols, rows, contentDivElem, refresh)

{

         var width = window.innerWidth;

        var height = window.innerHeight;

        var contents = contentDivElem;

        if (contents == "undefined")

                contents = "contents";
```

```
        var elem = document.getElementById(contents);
        elem.style.width = width + "px";
        elem.style.height = (height  - 40) + "px";

        var len = elem.children.length;
        var childElem;
        for (var i = 0; i < len; i++)
        {
                childElem = elem.children[i];
                childElem.style.width = (95 / cols)  + "%";
                childElem.style.height = (95 / rows) + "%";

                if (refresh != undefined && refresh)
                {
                        if (childElem.chart != undefined)
                                childElem.chart.refresh();
                }
        }
};

//used for defining the layout of drilldown chart
arrangeDrillDownCharts = function(cols, rows, contentDivElem, refresh)
{
        var offset = 0;
        var toolbars = document.getElementsByClassName("toolbar");
        if (toolbars != undefined && toolbars.length > 0)
                offset = toolbars[0].offsetHeight;

        var width = window.innerWidth;
        var height = window.innerHeight;
```

```
        var contents = contentDivElem;

        if (contents == "undefined")

                contents = "contents"



        var elem = document.getElementById(contents);

        elem.style.width = width + "px";

        elem.style.height = (height - offset - 40 - 40) + "px";



        childElem = elem.children[0];

        childElem.style.width = (95/cols) + "%";

        childElem.style.height = (95/rows) + "%";



        if (refresh != undefined && refresh)

        {

                if (childElem.drilldowngroup != undefined)

                        childElem.drilldowngroup.refresh();

        }

};
```

Note: You can customize this function for your app.

8. Add another JavaScript file, named `MyQuery.js`, to the `<Target Root>/js` folder. Leave this file empty for now; we will later add code to it.
9. Create a subfolder named `data` under the `<Target Root>` folder.

Add the Metadata Files for the Chart

MAKit uses metadata to define charts, so you must create all the metadata files for your app, and add them to the workflow project and put them under `<Target Root>/data` folder.

In this sample, we will show a column chart. The chart has been defined in `bi_chart_bar.xml` in the `data` folder, and looks like this:

```
<Chart Name="gr_1" ChartType="column" Query="productRevenueByYear" Title="Revenue By Year">

        <Category Column="year"/>

        <Series Column="product"/>

        <Values>

                <Value Expression="revenue" Format="currency"/>

        </Values>
```

```
</Chart>
```

For more information about the metadata definition, see “Metadata File” on page 33.

Add a New HTML Screen Page

1. On the Flow Design page, select **Screen** from the `Screens` folder, and add it to the workflow. Name the new screen `ColumnChart`.
2. Select the **GoTo** control from the palette, then click+drag from **RevenueByY** to **ColumnChart** to link the RevenueByY screen to the newly created screen. This adds a menu item to the RevenueByY screen.
3. On the ColumnChart design page, select the **HtmlView** control from the toolbox, then click inside the ColumnChart screen.
4. Click the **HtmlView** control, and on the property tab, create a new key (“ChartKey” or any name) for this view by clicking **New Key**. Set the value for this key as:

```
<div id="contents">

<div id="columnChart_1" class="chart"></div>

</div>
```

Create MAKit Chart

The generated code for the hybrid app includes a file named `Custom.js`. You can add your code to this file to customize your application. For our sample, add the code in the **customAfterShowScreen** function to create the chart. The code should look like:

```
function customAfterShowScreen(screenToShow, screenToHide) {

    if (screenToShow === "ColumnChart") {

            arrangeCharts(1, 1, "contents");//only one chart on then screen

            showFullBiChart("columnChart_1", "data/bi_chart_bar.xml");

    }

}
```

Note: "ColumnChart" is the key of the screen; "contents" is the ID defined above for a placeholder; "columnChart_1" is the ID of the chart defined above; "data/bi_chart_bar.xml" is the metadata file.

Add the code in the **showFullBiChart** function to the Custom.js file. The definition of the **showFullBiChart** function is:

```
function showFullBiChart(htmlElementID, metadataFile) {

    var elem = document.getElementById(htmlElementID);

    var chart = new $MA.Chart(elem.id, true);

    chart.load(metadataFile);

}
```

Get Data from Unwired Server

As MAKit is a query-based solution, the application developer must implement a query that provides data to a MAKit chart. Workflow developers must add the code that implements the query. In MAKit HTML5, a specific global function— **executeMAQuery**— is the only bridge or interface between MAKit and the hosting JavaScript. MAKit calls this function, which

returns a “dataTable” to MAKit, anytime it needs data. You can define the function in a separate `.js` file or in the `custom.js` file. For our sample, define it in the `MyQuery.js` file:

```
function executeMAQuery(chartObj, name, args){

    var dataTable;

    if (name === "productRevenueByYear") {

            dataTable = getProductRevenueByYearData();

            chartObj.setDataTable(dataTable);

    }

}
```

Note: " productRevenueByYear " is the query name defined in the metadata for the chart.

The **getProductRevenueByYearData** function gets the data for this chart. To retrieve data from the Unwired Server, **getProductRevenueByYearData** must call some additional functions from the Unwired Platform container. The code for retrieving data should be similar to:

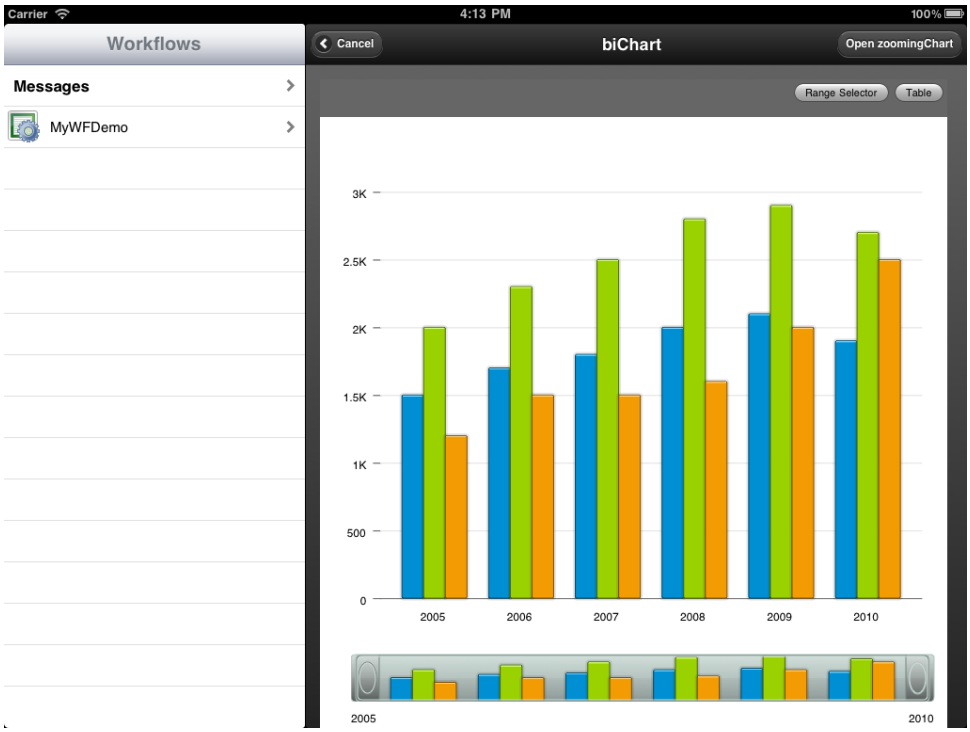
```
function getProductRevenueByYearData()

{

    //Define the table columns for the chart

    var dataTable = new $MA.DataTable();

    dataTable.addColumn("product", "string");

    dataTable.addColumn("year", "number");

    dataTable.addColumn("revenue", "number");


    //Get data from SUP MBO -- RevenueByY

    var message = getCurrentMessageValueCollection();

    var itemList = message.getData("RevenueByY");

    var items = itemList.getValue();

    var noOfItems = items.length;

    if (noOfItems > 0) {

            var i = 0;

            while (i < noOfItems) {

                    var theItems = items[i];

                    //Get column “year” from the MBO

                    var yearObj=theItems.getData("RevenueByY_year_attribKey");

                    var year = yearObj.getValue();
```

```
                    //Get column “product” from the MBO

                    var prodObj=theItems.getData("RevenueByY_product_attribKey");

                    var prod = prodObj.getValue();

                    //Get column “revenue” from the MBO

                    var amountObj=theItems.getData("RevenueByY_revenue_attribKey");

                    var amount = amountObj.getValue();

                     //Set the a row of data to the table

                    dataTable.addRow([prod, year, amount] );

                    i = i + 1;

            }

    }

    else {

            alert("No data is available.");

    }

    return dataTable;

}
```

Deploy the Workflow

1. Right-click the workflow page and select **Generate Mobile Workflow Package**.
2. Keep the default settings.
3. Click **Finish**.

At this point, you should have a workflow on your Unwired Server that shows a column chart.



Creating a Semantic Zooming Chart

Create Sample Data Tables

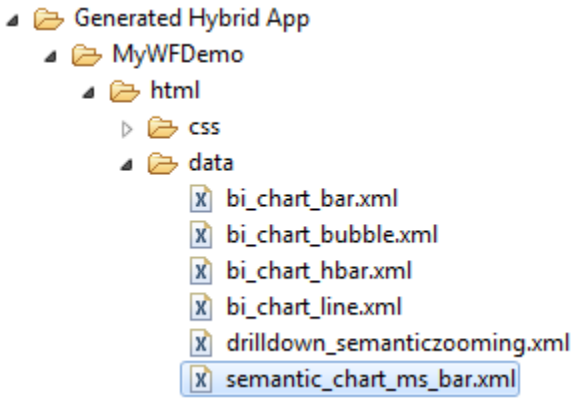
Zooming charts require two additional data tables for the Quarter and Month zooming levels. Check your database to verify the tables for semantic zooming chart exist. If they do not, create them by executing "SQL Statements for RevenueByQ Table" on page 98 and "SQL Statements for RevenueByM Table" on page 100.

Create MBOs for the Two Tables

See "Creating New MBOs" on page 5. Use "RevenueByQ" as the MBO name for the `RevenueByQ` table. Use "RevenueByM" as the MBO name for the `RevenueByM` table. Then deploy the MBOs to Unwired Server.

Add Metadata for the Semantic Zooming Chart

Create a new XML file and name it `semantic_chart_ms_bar.xml`. For this sample, add the metadata file to the `data` folder:



The metadata for the semantic zooming chart is defined in `semantic_chart_ms_bar.xml`, and must look like this:

```
<Chart Name="chart_1" ChartType="column" Query="productRevenueByYear" Title="Revenue">

    <Category Column="year"/>

    <Series Column="product"/>

    <Values>

            <Value Expression="revenue" Format="currency"/>

    </Values>

    <ZoomingLevels>

            <ZoomingLevel Query="productRevenueByYear" CategoryColumn="year" Title="Year"/>

            <ZoomingLevel Query="productRevenueByQuarter" CategoryColumn="quarter" Title="Quarter"/>

            <ZoomingLevel Query="productRevenueByMonth" CategoryColumn="month" Title="Month"/>

    </ZoomingLevels>

</Chart>
```

For more information about the metadata definition, see “Metadata File” on page 33.

Add New HTML Screen Pages

1. On the Flow Design page, select **Screen** from the `Screens` folder, and add it to the workflow. Name the new screen `ZoomingChart`.
2. Select the **GoTo** control from the palette, then click+drag from **RevenueByY** to **ZoomingChart** to link the RevenueByY screen to the newly created screen. This adds a menu item to the RevenueByY screen.
3. Go to the screen (ZoomingChart) design page and add an HtmlView control to the screen by selecting **HtmlView** from the toolbox, then clicking inside the ZoomingChart screen.
4. Click the **HtmlView** control, and on the property tab, create a new key (“zoomingChartKey” or any name) for this view by clicking **New Key**. Set the value for this key as:

   ```
   <div id="zContents">
       <div id="zChart_1" class="chart"></div>
   </div>
   ```

5. Create another two screens for data retrieval. To bind the MBO to the workflow (or its screen), create one screen for each MBO—one screen for the RevenueByQ MBO, and one for the RevenueByM MBO.
   - In WorkSpace Navigator, select **demo1 > Mobile Business Object** to show all MBOs.
   - Drag the **RevenueByQ** MBO to the workflow form. Two screens are automatically created—RevenueByQ and RevenueByQDetail. RevenueByQ contains a listview that shows the data from the RevenueByQ MBO.
   - Drag the **RevenueByM** MBO to the workflow form. Two screens are automatically created—RevenueByM and RevenueByMDetail. RevenueByM contains a listview that shows the data from the RevenueByM MBO.
6. Add one action menu item for retrieving the data from RevenueByQ.
   - On the Flow Design tab, double-click **ZoomingChart**.
   - Delete the “Submit” menu item if it exists. Then add a new menu item named `GetQData`.
   - On the GetQData property page:
     - Change the type from “Save Screen” to “Online Request.”
     - Set the Mobile Business Object to `demo1/RevenueByQ`.
     - Select **Invoke object query** and unselect “Generate old values keys.”

    - For Object Query, select **findAll** to retrieve all data rows.
    - Save the screen.

7. Add another action menu item for retrieving the data from RevenueByM.
   - On the Flow Design tab, double-click **ZoomingChart**.
   - Delete the "Submit" menu item if it exists. Then add a new menu item named `GetMData`.
   - On the GetMData property page:
     - Change the type from "Save Screen" to "Online Request".
     - Set the Mobile Business Object to `demo1/RevenueByM`.
     - Select **Invoke object query** and unselect "Generate old values keys."
     - For Object Query, select **findAll** to retrieve all data rows.
     - Save the screen.

Create the MAKit Semantic Chart

The generated code for the hybrid app includes a `Custom.js` file. You can add your code to this file to customize your application. For our sample, add the following code to the **customAfterShowScreen** function to create the chart; leave the rest of this function untouched. The code should look like:

```
if (screenToShow === "ZoomingChart") {

    arrangeCharts(1, 1, "zContents");    //only one chart on then screen

    showFullZoomingChart("zChart_1", "data/semantic_chart_ms_bar.xml");

}
```

Note: " ZoomingChart" is the key of the screen; " zContents" is the ID defined above for a placeholder; "zChart_1" is the ID of the chart defined above; "data/ semantic_chart_ms_bar.xml" is the metadata file.

The definition of the **showFullZoomingChart** function is:

```
function showFullZoomingChart (htmlElementID, metadataFile) {

    var elem = document.getElementById(htmlElementID);

    var chart = new $MA.Chart(elem.id, true);

chart.load(metadataFile);

}
```

Get Data from the Unwired Server

A semantic zooming chart needs several queries to get the data for different zooming levels. Whenever the chart needs data, it calls the **executeMAQuery** function and passes the query name to it. Workflow developers must add code to implement the queries.

In the Unwired Platform Hybrid Web container, data retrieval is asynchronous, which means that when you request data from the Unwired Server, the application does not wait for the return of the data, but continues executing code. When the data is ready, the application calls the callback function **customAfterDataReceived**.

Add your new query handling code to **executeMAQuery** as follows and keep the existing code in this function untouched:

```
var yDataOK;                            //if the data for Year is ready

var qDataOK = false;                    //if the data for Quarter is ready

var mDataOK = false;                    //if the data for Month is ready
```

```
var myWorkflowMessage;          //the incoming message

var ChartObject;                //the chart object

var QueryName;                  // the query name

var Args                        //possible argument

function executeMAQuery(chartObj, name, args){

    var dataTable;

if (name === "productRevenueByYear") {           //for the simple chart sample

        dataTable = getProductRevenueByYearData();

        chartObj.setDataTable(dataTable);

}

else if (name === "productRevenueByQuarter") {

        if (qDataOK == false) {

                ChartObject = chartObj;

                QueryName = name;

                Args = args;

                retrieveRevemueByQData();        //send request to get data(1)

        }

        else {

                //get the data and pass it to the chart

                var dataTable = getProductRevenueByQuarterData(args) //get data (2)

                chartObj.setDataTable(dataTable);

                chartObj.refresh();

                QueryName = null;

                Args = null;

        }

}

else if (name === "productRevenueByMonth") {

        if (mDataOK == false) {

                ChartObject = chartObj;

                QueryName = name;

                Args = args;
```

```
                retrieveRevemueByMData();        //send request to get data(3)

        }

        else {

                var dataTable = getProductRevenueByMonthData(args)       //get data (4)

                chartObj.setDataTable(dataTable);

                chartObj.refresh();

QueryName = null;

                Args = null;

        }

}

else {



}



}
```

Note: "productRevenueByQuarter" and "productRevenueByMonth" are the query names defined in the metadata for quarter and month levels.

As the query code shows, if the quarter-level data is ready, the **getProductRevenueByQuarterData** function is called to retrieve the data; if the month-level data is ready, the **getProductRevenueByMonthData** function is called to retrieve the data. These functions are defined as:

```
function getProductRevenueByQuarterData(args)

{

    var dataTable = new $MA.DataTable();

    dataTable.addColumn("product", "string");

    dataTable.addColumn("year", "number");

    dataTable.addColumn("quarter", "number");

    dataTable.addColumn("revenue", "number");



    //Get data from SUP MBO -- RevenueByQ

    var message = getCurrentMessageValueCollection();

    var itemList = message.getData("RevenueByQ");

    var items = itemList.getValue();

    var noOfItems = items.length;
```

```
    if (noOfItems > 0) {
        var i = 0;
         while (i < noOfItems) {
                 var theItems = items[i];
                var yearObj=theItems.getData("RevenueByQ_year_attribKey");
                var year = yearObj.getValue();

                var prodObj=theItems.getData("RevenueByQ_product_attribKey");
                var prod = prodObj.getValue();

                var qObj=theItems.getData("RevenueByQ_quarter_attribKey");
                var quarter = qObj.getValue();

                var amountObj=theItems.getData("RevenueByQ_revenue_attribKey");
                var amount = amountObj.getValue();

                dataTable.addRow([prod, year, quarter, amount] );
                i = i + 1;
         }
    }
    else {
        alert("No data is available.");
    }
    return dataTable;
}

function getProductRevenueByMonthData(args)
{
    var dataTable = new $MA.DataTable();
    dataTable.addColumn("product", "string");
    dataTable.addColumn("year", "number");
```

```
dataTable.addColumn("quarter", "number");

dataTable.addColumn("month", "number");

dataTable.addColumn("revenue", "number");


//Get data from SUP MBO -- RevenueByM

var message = getCurrentMessageValueCollection();

var itemList = message.getData("RevenueByM");

var items = itemList.getValue();

var noOfItems = items.length;

if (noOfItems > 0) {

    var i = 0;

     while (i < noOfItems) {

            var theItems = items[i];

            var yearObj=theItems.getData("RevenueByM_year_attribKey");

            var year = yearObj.getValue();


            var prodObj=theItems.getData("RevenueByM_product_attribKey");

            var prod = prodObj.getValue();


            var qObj=theItems.getData("RevenueByM_quarter_attribKey");

            var quarter = qObj.getValue();


            var mObj=theItems.getData("RevenueByM_month_attribKey");

            var month = mObj.getValue();


            var amountObj=theItems.getData("RevenueByM_revenue_attribKey");

            var amount = amountObj.getValue();


            dataTable.addRow([prod, year, quarter, month, amount] );

            i = i + 1;

      }
```

```
    }

    else {

        alert("No data is available.");

    }

    return dataTable;

}
```

This code shows that if the quarter-level or month-level data is not ready, **retrieveRevenueByQData** or **RetrieveRevenueByMData** is called to request the data. These two functions are defined as:

```
//Send request to get Quarter data

function retrieveRevemueByQData() {

var rmiKeys = [];

    var rmiKeyTypes = [];

    var rmiInputOnlyKeys = [];

    var rmiInputOnlyKeyTypes = [];

    var workflowMessageToSend = getMessageValueCollectionForOnlineRequest('ZoomingChart', 'GetQData',
rmiKeys, rmiKeyTypes);

    var inputOnlyWorkflowMessageToSend = getMessageValueCollectionForOnlineRequest('ZoomingChart',
'GetQData', rmiInputOnlyKeys, rmiInputOnlyKeyTypes);



doOnlineRequest('ZoomingChart', 'GetQData', 60, 0, '', null, workflowMessageToSend,
inputOnlyWorkflowMessageToSend.serializeToString());

}



//Send request to get Month data

function retrieveRevemueByMData() {

 var rmiKeys = [];

 var rmiKeyTypes = [];

 var rmiInputOnlyKeys = [];

 var rmiInputOnlyKeyTypes = [];

 var workflowMessageToSend = getMessageValueCollectionForOnlineRequest('ZoomingChart', 'GetMData', rmiKeys,
rmiKeyTypes);

var inputOnlyWorkflowMessageToSend = getMessageValueCollectionForOnlineRequest('ZoomingChart', 'GetMData',
rmiInputOnlyKeys, rmiInputOnlyKeyTypes);
```

```
doOnlineRequest('ZoomingChart', 'GetMData', 60, 0, '', null, workflowMessageToSend,
inputOnlyWorkflowMessageToSend.serializeToString());

}
```

Data communication from Unwired Server is asynchronous. When the data is ready, the system calls the **customAfterDataReceived** function, which is defined in `Custom.js`. Add code to this function to retrieve the data and pass it to the MAKit chart:

```
function AfterQueryDataReceived(incomingWorkflowMessage) {

        myWorkflowMessage = incomingWorkflowMessage;

        try

        {

                var valueCols = incomingWorkflowMessage.getValues();

                //check data for year

                var yItemList = valueCols.getData("RevenueByY");

                if (yItemList != undefined) {

                        yDataOK = true;

                }

                else {

                        yDataOK = false;

                }

                //check data for quarter

                var qItemList = valueCols.getData("RevenueByQ");

                if (qItemList != undefined) {

                        qDataOK = true;

                }

                else {

                        qDataOK = false;

                }

                //check data for month

                var mItemList = valueCols.getData("RevenueByM");

                if (mItemList != undefined) {

                        mDataOK = true;

                }
```

```
                else {
                        mDataOK = false;
                }

                //send the specific data back to MAKIT Chart
                if (QueryName === "productRevenueByYear") {
                        var dataTable = getProductRevenueByYearData();
                        ChartObject.setDataTable(dataTable);
                        dataTable.refresh();
                }
                else if (QueryName === "productRevenueByQuarter") {
                        var dataTable = getProductRevenueByQuarterData(Args)
                        ChartObject.setDataTable(dataTable);
                        dataTable.refresh();
                }
                else if (QueryName === "productRevenueByMonth") {
                        var dataTable = getProductRevenueByMonthData(Args);
                        ChartObject.setDataTable(dataTable);
                        dataTable.refresh();
                }
                else {

                }

                QueryName = null;
                Args = null;

        }
        catch (err)
        {
                QueryName = null;
```

```
                Args = null;

        }

}
```

Deploy the Workflow

1. Right-click the workflow page and select **Generate Mobile Workflow Package**.
2. Keep the default settings.
3. Click **Finish**.

You should see a workflow on your Unwired Server that shows a semantic zooming chart.

Note: If the app transits to the ZoomingChart screen, you see two menu items—GetQData and GetMData. We created them for MBO binding and data retrieval; but we do not want them to appear. To hide them, add this code to the **customBeforeShowScreen** function in `Custom.js`:

```
function customBeforeShowScreen(screenToShow, screenToHide) {

    if (screenToShow === "ZoomingChart") {

            removeMenuItem("ZoomingChart", "GetQData")

            removeMenuItem("ZoomingChart", "GetMData")

    }

    return true;

}
```

The zooming chart is similar to the one shown below. To see the zooming levels, click **Year**, **Quarter**, or **Month**.

Creating a Drilldown Chart

Create Sample Data Tables

This drilldown chart requires a new table from the sample database. The table name is `EmpIncome`. Check your database to verify the table exists. If it does not, create it by executing the "**SQL Statements for EmpIncome Table**," on page 108.

Create MBOs for Drilldown Chart

This sample has three levels to drill down and up: Branch, Department, and Employee.

Create MBO for Branch

Create an MBO to show total income and bonuses for every branch. We will create two computed columns to sum the salaries and bonus column for a branch.

1. From WorkSpace Navigator, right-click the **demo1** folder, then select **Open in Diagram Editor.**
2. Right-click **Mobile Business Object** under `demo1` folder. Then select **New > Mobile Business Object**.
3. Enter `Branch` as the MBO name.
4. Choose **Select a Data Source**. Enter `JDBC` as the datasource type, and `My Sample Database` as the connection profile, then click **Next.**
5. Select **SQL Query Statement**, then enter:

```
SELECT branCode, SUM(income), incomeType, SUM(size) FROM EmpIncome GROUP BY branCode, incomeType ORDER BY branCode, incomeType
```

6. Click **Finish**.

Create MBO for Department

The second level is for Department. Create an MBO to show all departments for specific branch. This MBO takes the branch code as a parameter.

1. Create the MBO:
   - Right-click **Mobile Business Object** under the `demo1` folder. Then select **New > Mobile Business Object.**
   - Enter `dept` as the MBO name.
   - Choose **Select a Data Source**. Enter `JDBC` as the datasource type, and `My Sample Database` as the connection profile, then click **Next.**
   - Select **SQL Query Statement**, then enter:

```
SELECT branCode, deptCode, SUM(income), incomeType,SUM(size) FROM EmpIncome GROUP BY branCode, deptCode, incomeType ORDER BY branCode, deptCode, incomeType
```

   - Click **Finish**.
2. Define object queries. A new query is needed to define the result set.
   - Select the **Object Queries** tab.
   - Click **Add**, and in the new query wizard:
     - Enter `findByBranchCode` as the query name.
     - Click **Add** to add a new parameter.
     - Enter `brCode_param` as the parameter name.
     - Select **INT** as the datatype.
     - Unselect "Nullable."
     - Select **branCode** as the **Mapped to** value.
   - Click **Generate**. The query statement should look like:

```
SELECT x.* FROM dp x WHERE x.branCode = :brCode_param
```

   - Select **Create an index**.

- Select **Return Multiple Objects**.
- Click **Finish**.

Note: Make note of the query parameter name (**brCode_param**) for later use, when you define the screen and menu item.

Create MBO for Employee

The third drilldown level is Employee. Create an MBO to show all employees for specific branch and department. This MBO takes the branch code and department code as parameters.

1. Create the MBO:
   - Right-click **Mobile Business Object** under the `demo1` folder. Then select **New > Mobile Business Object**.
   - Enter `Employee` as the MBO name.
   - Choose **Select a Data Source**. Enter `JDBC` as the datasource type, and `My Sample Database` as the connection profile, then click **Next**.
   - Select **SQL Query Statement,** and enter:

     ```
     SELECT branCode, deptCode, empCode, SUM(income), EmpIncome.incomeType, SUM(size) FROM
     EmpIncome GROUP BY branCode, deptCode, empCode, incomeType ORDER BY branCode, deptCode,
     empCode, incomeType
     ```

   - Click **Finish**.
2. Define object queries:
   - Select the **Object Queries** tab.
   - Click **Add**, and in the new query wizard:
     - Enter `findByBranchDeptCode` as the query name.
     - Click **Add** to add a new parameter.
     - Enter `emp_brCode_param` as the parameter name.
     - Select **INT** as the datatype.
     - Unselect "Nullable."
     - Select **branCode** as the **Mapped to** value.
     - Click **Add** to add another new parameter.
     - Enter `emp_deptCode_param` as the parameter name.
     - Select **INT** as the datatype.
     - Unselect "Nullable."
     - Select **deptCode** as the **Mapped to** value.
   - Click **Generate.** The query statement should look like:

     ```
     SELECT x.* FROM Employee x WHERE x.branCode = :emp_brCode_param AND x.deptCode =
     :emp_deptCode_param
     ```

   - Select **Create an index**.
   - Select **Return Multiple Objects**.
   - Click **Finish**.

   Note: Make note of the query parameter keys (**emp_brCode_param** and **emp_deptCode_param**) for later use, when you define the screen and menu item.

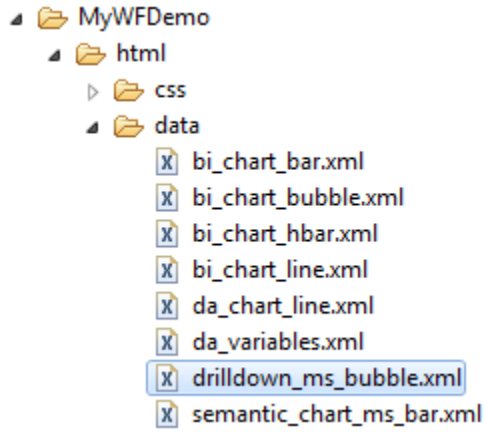
Deploy the MBOs to the SUP Server

1. From the WorkSpace Navigator, right-click **Mobile Business Objects**, then select **Deploy Project**.
2. Select either **New** or **Update** as the deployment mode, keep the default name (`demo1`) as the package name. and then click **Next**.
3. Review MBO list, click **Next** to continue.
4. Click **Next** again.

5. Choose **My Unwired Server** as the target server, click **Next** to continue.
6. Click **Next** again.
7. Choose the Server Connection for My Sample Database, and choose **sampleDB**.
8. Click **Finish**.

Add Metadata for the Drilldown Chart

Create a new XML file and name it `drilldown_ms_bubble.xml.` For the sample, add the metadata file to the `data` folder:



The metadata for the drilldown chart is defined in `drilldown_ms_bubble.xml`. The contents of this metadata file must look like:

```
<DrillDownGroup>

    <Chart Name="chart_1" ChartType="bubble" Query="branIncomeDetail" Title="Employee Income Detail By
Branch">

        <Category Column="branCode" DisplayName="Branch Code"/>

        <Series Column="incomeType"/>

    <Values>

        <Value Expression="branIncome" DisplayName="Employee Income Detail"/>

        <Value Expression="bubbleSize"/>

    </Values>

    </Chart>

    <Chart Name="chart_2" ChartType="bubble" Query="deptIncomeDetail" Title="Employee Income Detail By
Department">

        <Category Column="deptCode" DisplayName="Department Code"/>

        <Series Column="incomeType"/>

    <Values>

        <Value Expression="branIncome" DisplayName="Employee Income Detail"/>

        <Value Expression="bubbleSize"/>

    </Values>
```

```
    </Chart>

    <Chart Name="chart_3" ChartType="bubble" Query="empIncomeDetail" Title="Individual Employee Income
Detail">

        <Category Column="empCode" DisplayName="Employee Code"/>

        <Series Column="incomeType"/>

    <Values>

        <Value Expression="branIncome" DisplayName="Employee Income Detail"/>

        <Value Expression="bubbleSize"/>

    </Values>

    </Chart>

</DrillDownGroup>
```

For more information about the metadata definition, see "Metadata File" on page 33.

Add New HTML Screen Pages

1. On the Flow Design page, select **Screen** from the `Screens` folder, and add it to the workflow. Name the new screen `dwChart`.
2. Select the **GoTo** control from the palette, then click+drag from **RevenueByY** to **dwChart** to link the RevenueByY screen to the newly created screen. This adds a menu item to the RevenueByY screen .
3. Go to the screen (dwChart) design page. Select the **HtmlView** control from the toolbox, then click inside the dwChart screen.
4. Click the **HtmlView** control, and on the property tab, create a new key ("dwChartKey" or any name) for this view by clicking **New Key**. Set the value for this key as:

```
<div id="dwContents">

<div id="dwChart_1"></div>
</div>
```

5. Create three keys for data mapping. The Dept MBO needs one parameter, and the Employee MBO needs two parameters to retrieve data. Therefore, define three keys for the user to input the data in the workflow.
    - Click the dwChart screen outside the HtmlView control.
    - Go to the property tab.
    - In the left pane, click **Keys**, and in the right pane, click **New.**
        - Enter **KeyforQueryDept** as the name.
        - Enter **int** as the type.
        - Leave all other fields at their default values.
    - Click **OK** to save.

    Repeat these steps to create two more keys named **branKeyforQueryEmp** and **deptKeyforQueryEmp**. All other properties are the same as **KeyforQueryDept**.

    Note: Make note of these key names (**KeyforQueryDept, branKeyforQueryEmp, deptKeyforQueryEmp**) for later use, when you define the screen and menu item.

6. Create another three screens for data retrieval. To bind the MBOs to the workflow, you must create a screen for each MBO: Branch, Dept, and Employee.
    - In the WorkSpace Navigator, click **demo1 > Mobile Business Object** to show all MBOs.

- Drag the **Branch** MBO to the workflow form. Two screens are automatically created—Branch and BranchDetail. The Branch screen contains a listview that shows the data from the Branch MBO.
- Drag the **dept** MBO to the workflow form. Two screens are automatically created—dept and deptDetail. The **dept** screen contains a listview that shows the data from the **dept** MBO.
- Drag the **Employee** MBO to the workflow form. Two screens are automatically created—Employee and EmployeeDetail. The Employee screen contains a listview that shows the data from the Employee MBO.

7. Add one action menu item to retrieve data from the Branch MBO.
    - On the Flow Design tab, double-click the **dwChart** screen.
    - Delete the "Submit" menu item if it exists. Then add a new menu item named `GetBranch`.
    - On the GetBranch property page:
        - Change the type from "Save Screen" to "Online Request."
        - Set the Mobile Business Object to `demo1/Branch`.
        - Select **Invoke object query** and unselect "Generate old values keys."
        - For Object Query, select **findAll** to retrieve all data rows.
    - Save the screen.
8. Add another action menu item to retrieve data from the Dept MBO.
    - On the Flow Design tab, double-click the **dwChart**.
    - Add a new menu item named `GetDept`.
    - On the GetDept property page:
        - Change the type from "Save Screen" to "Online Request."
        - Set the Mobile Business Object to `demo1/dept`.
        - Select **Invoke object query** and unselect "Generate old values keys."
        - For Object Query, select **findByBranchCode** to retrieve data.
    - In the left pane, click **Parameter Mappings.** You see there is one parameter (**brCode_param**). Click **Edit** to set the mapping. Set the mapping type as **Key** and select **KeyforQueryDept** as the mapping key.
    - Save the screen.
9. Add one more action menu item to retrieve data from the Employee MBO.
    - On the Flow Design tab, double-click **dwChart**.
    - Add a new menu item named `GetEmployee`.
    - Make these changes on the GetEmployee property page:
        - Change the type from "Save Screen" to "Online Request."
        - Set the Mobile Business Object to `demo1/Employee`.
        - Select **Invoke object query** and unselect "Generate old values keys."
        - For Object Query, select **findByBranchDeptCode** to retrieve data.
    - In the left pane, click **Parameter Mappings.**
        - Choose **emp_brCode_param** and click **Edit** to set the mapping. Set the mapping type as **Key** and select **branKeyforQueryEmp** as the mapping key.
        - Choose **emp_deptCode_param** and click **Edit** to set the mapping. Set the mapping type as **Key** and select **deptKeyforQueryEmp** as the mapping key.
    - Save the screen.

Create the MAKit Drilldrown Chart

The generated code for the hybrid app includes a `Custom.js` file. You can add your code to this file to customize your application. For our sample, add the following code to the **customAfterShowScreen** function to create the drilldown chart. Leave the remainder of this function unchanged.

```
if (screenToShow === "dwChart") {

    showFulldwChart("dwChart_1", "data/drilldown_ms_bubble.xml");

}
```

Note: “dwChart" is the key of the screen; "dwContents " is the ID defined above for a placeholder; "dwChart_1" is the ID of the chart defined above; "data/drilldown_ms_bubble.xml" is the metadata file.

The definition of the **showFulldwChart** function is:

```
function showFulldwChart(htmlElementID, metadataFile) {

    arrangeDrillDownCharts(1, 1, "dwContents");

    var elem = document.getElementById(htmlElementID);

    var chart = new $MA.DrillDownGroup(elem.id, true);

    chart.load(metadataFile);



}
```

Get Data from Unwired Server

The drilldown chart needs several queries to get the data for different zooming levels. Whenever the chart needs data, it calls the **executeMAQuery** function and passes the query name to it. For this sample, we need three queries, to retrieve data from each of the Branch, Department, and Employee MBOs. Workflow developers must add code to implement these queries.

In the Unwired Platform Hybrid Web container, data retrieval is asynchronous, which means that when you request data from the Unwired Server, the application does not wait for the return of the data, but continues executing code. When the data is ready, the application calls the callback function **customAfterDataReceived**.

Add Global Variables and Modify the executeMAQuery Function

Add new query handling code to **executeMAQuery** as shown below. Leave the existing code in this function unchanged:

```
var yDataOK;                            //if the data for Year is ready

var qDataOK = false;                    //if the data for Quarter is ready

var mDataOK = false;                    //if the data for Month is ready

var myWorkflowMessage;                  //the incoming message

var ChartObject;                        //the chart object

var QueryName;                          // the query name

var Args                                //possible argument


var branDataOK = false;                 //if the data for Branch is ready

var bran4DeptQuery;           //variable to store the branch value for dept retrieval

var bran4EmployeeKey;         //variable to store the branch value for employee retrieval

var dept4EmployeeKey;         //variable to store the dept value for employee retrieval


function executeMAQuery(chartObj, name, args){

    var dataTable;
```

```
if (name === "productRevenueByYear") {               //for the simple chart sample
    dataTable = getProductRevenueByYearData();
    chartObj.setDataTable(dataTable);
}
else if (name === "productRevenueByQuarter") {
    if (qDataOK == false) {
            ChartObject = chartObj;
            QueryName = name;
            Args = args;
            retrieveRevemueByQData();        //send request to get data(1)
    }
    else {
            //get the data and pass it to the chart
            var dataTable = getProductRevenueByQuarterData(args) //get data (2)
            chartObj.setDataTable(dataTable);
            chartObj.refresh();
            QueryName = null;
            Args = null;
    }
}
else if (name === "productRevenueByMonth") {
    if (mDataOK == false) {
            ChartObject = chartObj;
            QueryName = name;
            Args = args;
            retrieveRevemueByMData();        //send request to get data(3)
    }
    else {
            var dataTable = getProductRevenueByMonthData(args)       //get data (4)
            chartObj.setDataTable(dataTable);
            chartObj.refresh();
```

```
            QueryName = null;
            Args = null;
        }
    }
    else if (name === "branIncomeDetail") {
        if (branDataOK == false) {
            ChartObject = chartObj;
            QueryName = name;
            Args = args;
            retrieveBranchDetailData();      //send request to get data
        }
        else {
            var dataTable = getBranchDetailData(args)        //get data
            chartObj.setDataTable(dataTable);
            chartObj.refresh();
        }
    }
    else if (name === "deptIncomeDetail") {
        ChartObject = chartObj;
        QueryName = name;
        Args = args;
        retrieveDeptDetailData(args);    //send request to get data
    }
    else if (name === "empIncomeDetail") {
        ChartObject = chartObj;
        QueryName = name;
        Args = args;
        retrieveEmployeeDetailData(args);        //send request to get data
    }
    else {
```

```
    }

}
```

Note: “branIncomeDetail", “deptIncomeDetail”, and “empIncomeDetail” are the query names defined in the metadata for branch, department, and employee drilldown levels.

Request Data from the Server

If branch data is not ready, or is being retrieved for the first time, **retrieveBranchDetail** is called to request the data. The function is defined as:

```
//Send request to get Branch data

function retrieveBranchDetailData() {

    var rmiKeys = [];

    var rmiKeyTypes = [];

    var rmiInputOnlyKeys = [];

    var rmiInputOnlyKeyTypes = [];

    var workflowMessageToSend = getMessageValueCollectionForOnlineRequest('dwChart', 'GetBranch', rmiKeys,
rmiKeyTypes);

var inputOnlyWorkflowMessageToSend = getMessageValueCollectionForOnlineRequest('dwChart', 'GetBranch',
rmiInputOnlyKeys, rmiInputOnlyKeyTypes);

doOnlineRequest('dwChart', 'GetBranch', 60, 0, '', null, workflowMessageToSend,
inputOnlyWorkflowMessageToSend.serializeToString());

}

//Send request to get Dept data

function retrieveDeptDetailData(args) {

    var rmiKeys = [];

    var rmiKeyTypes = [];

    var rmiInputOnlyKeys = [];

    var rmiInputOnlyKeyTypes = [];

    bran4DeptQuery = args[0].itemValues[0];      //save the branch code

    var workflowMessageToSend = getMessageValueCollectionForOnlineRequest('dwChart', 'GetDept', rmiKeys,
rmiKeyTypes);

var inputOnlyWorkflowMessageToSend = getMessageValueCollectionForOnlineRequest('dwChart', 'GetDept',
rmiInputOnlyKeys, rmiInputOnlyKeyTypes);

doOnlineRequest('dwChart', 'GetDept', 60, 0, '', null, workflowMessageToSend,
inputOnlyWorkflowMessageToSend.serializeToString());

}

//Send request to get Employee data
```

```
function retrieveEmployeeDetailData(args) {

    var rmiKeys = [];

    var rmiKeyTypes = [];

    var rmiInputOnlyKeys = [];

    var rmiInputOnlyKeyTypes = [];

    bran4EmployeeKey = args[0].itemValues[0];    //save the branch code

    dept4EmployeeKey = args[1].itemValues[0];    //save the department code

    var workflowMessageToSend = getMessageValueCollectionForOnlineRequest('dwChart', 'GetEmployee',
rmiKeys, rmiKeyTypes);

var inputOnlyWorkflowMessageToSend = getMessageValueCollectionForOnlineRequest('dwChart', 'GetEmployee',
rmiInputOnlyKeys, rmiInputOnlyKeyTypes);

doOnlineRequest('dwChart', 'GetEmployee', 60, 0, '', null, workflowMessageToSend,
inputOnlyWorkflowMessageToSend.serializeToString());

}
```

Add Values for the Query Parameters

To retrieve department and employee data, we must provide the values for the query parameters before the online request is actually submitted. The SUP workflow container provides a callback function, **customBeforeSubmit**, in `Custom.js` that allows you to customize the message before it is submitted. For the sample, we'll customize our request message to include the query parameters. After customization, this function should look similar to:

```
function customBeforeSubmit (screenKey, actionName, workflowMessageToSend) {

    if ((screenKey === "dwChart") && (actionName === "GetDept")) {

        var myNewValue1 = new MessageValue();

        myNewValue1.setKey("KeyforQueryDept");

        myNewValue1.setValue(bran4DeptQuery);    // bran4DeptQuery was set in retrieve function

        myNewValue1.setType("NUMBER");



        var mvc = workflowMessageToSend.getValues();

        if( mvc ) {

                var oldKey = mvc.getData("KeyforQueryDept");

                if (oldKey != undefined) {

                        mvc.remove("KeyforQueryDept")

                }

                mvc.add( myNewValue1.getKey(), myNewValue1 );

        }
```

```
    }
    if ((screenKey === "dwChart") && (actionName === "GetEmployee")) {
        var myNewValue1 = new MessageValue();
        myNewValue1.setKey("branKeyforQueryEmp");
        myNewValue1.setValue(bran4EmployeeKey); //bran4EmployeeKey was set in retrieve function
        myNewValue1.setType("NUMBER");

        var myNewValue2 = new MessageValue();
        myNewValue2.setKey("deptKeyforQueryEmp");
        myNewValue2.setValue(dept4EmployeeKey); //bran4EmployeeKey was set in retrieve function
        myNewValue2.setType("NUMBER");

        var mvc = workflowMessageToSend.getValues();
        if( mvc ) {
                //add the query value for branCode
                var oldKey = mvc.getData("branKeyforQueryEmp");
                if (oldKey != undefined) {
                        mvc.remove("branKeyforQueryEmp")
                }
                mvc.add( myNewValue1.getKey(), myNewValue1 );

                //add the query value for deptCode
                var oldKey = mvc.getData("deptKeyforQueryEmp");
                if (oldKey != undefined) {
                        mvc.remove("deptKeyforQueryEmp")
                }
                mvc.add( myNewValue2.getKey(), myNewValue2 );
        }
    }
    return true;
}
```

Get the Return Data

Data communication from the Unwired Server is asynchronous. When the data is ready, the SUP Container calls the callback function **customAfterDataReceived** in `Custom.js`. Add code to this function to get branch, department, and employee data, and pass it to the drilldown chart. Add your code for this drilldown chart; but do not remove the code for other charts. After customization, **customAfterDataReceived** should look similar to:

```
function AfterQueryDataReceived(incomingWorkflowMessage) {

    myWorkflowMessage = incomingWorkflowMessage;

    try

    {

        var valueCols = incomingWorkflowMessage.getValues();

        //check data for year

        var yItemList = valueCols.getData("RevenueByY");

        if (yItemList != undefined) {

                yDataOK = true;

        }

        else {

                yDataOK = false;

        }

        //check data for quarter

        var qItemList = valueCols.getData("RevenueByQ");

        if (qItemList != undefined) {

                qDataOK = true;

        }

        else {

                qDataOK = false;

        }

        //check data for month

        var mItemList = valueCols.getData("RevenueByM");

        if (mItemList != undefined) {

                mDataOK = true;

        }

        else {

                mDataOK = false;
```

```
        }
        //check data for branch
        var bItemList = valueCols.getData("Branch");
        if (bItemList != undefined) {
                branDataOK = true;
        }
        else {
                branDataOK = false;
        }
        //get data for Year
        if (QueryName === "productRevenueByYear") {
                var dataTable = getProductRevenueByYearData();
                ChartObject.setDataTable(dataTable);
                dataTable.refresh();
        }
        else if (QueryName === "productRevenueByQuarter") {
                var dataTable = getProductRevenueByQuarterData(Args);
                ChartObject.setDataTable(dataTable);
                dataTable.refresh();


        }


        else if (QueryName === "productRevenueByMonth") {
                var dataTable = getProductRevenueByMonthData(Args);
                ChartObject.setDataTable(dataTable);
                dataTable.refresh();
        }
        else if (QueryName === "branIncomeDetail") {
                var dataTable = getBranchDetailData(Args);
                ChartObject.setDataTable(dataTable);
                dataTable.refresh();
```

```
        }
        else if (QueryName === "deptIncomeDetail") {
                var dataTable = getDeptDetailData(Args);
                ChartObject.setDataTable(dataTable);
                dataTable.refresh();
        }
        else if (QueryName === "empIncomeDetail") {
                var dataTable = getEmployeeDetailData(Args);
                ChartObject.setDataTable(dataTable);
                dataTable.refresh();
        }
        else {


        }


        QueryName = null;
        Args = null;
    }
    catch (err)
    {
        QueryName = null;
        Args = null;
    }
}
```

The functions to get the data are defined as follows.

```
    //get Branch data
function getBranchDetailData(args)
{
    var dataTable = new $MA.DataTable();
    dataTable.addColumn("branCode", "number");
    dataTable.addColumn("incomeType", "string");
```

```
dataTable.addColumn("branIncome", "number");

dataTable.addColumn("bubbleSize", "number");


//Get data from SUP MBO -- Branch

var message = getCurrentMessageValueCollection();

var itemList = message.getData("Branch");

var items = itemList.getValue();

var noOfItems = items.length;

if (noOfItems > 0) {

    var i = 0;

    while (i < noOfItems) {

       var theItems = items[i];

       var yearObj=theItems.getData("Branch_branCode_attribKey");

       var branCode = yearObj.getValue();


       var prodObj=theItems.getData("Branch_incomeType_attribKey");

       var incometype = prodObj.getValue();


       var qObj=theItems.getData("Branch_income__attribKey");

       var income = qObj.getValue();


       var mObj=theItems.getData("Branch_size__attribKey");

       var sz = mObj.getValue();


       dataTable.addRow([branCode, incometype, income, sz] );


       i = i + 1;

     }

}

else {

    alert("No data is available.");
```

```
    }

    return dataTable;
}
//get Dept data
function getDeptDetailData(args)
{
    var dataTable = new $MA.DataTable();
    dataTable.addColumn("branCode", "number");
    dataTable.addColumn("deptCode", "number");
    dataTable.addColumn("incomeType", "string");
    dataTable.addColumn("branIncome", "number");
    dataTable.addColumn("bubbleSize", "number");

    //Get data from SUP MBO -- Dept
    var message = getCurrentMessageValueCollection();
    var itemList = message.getData("dept");
    var items = itemList.getValue();
    var noOfItems = items.length;
    if (noOfItems > 0) {
        var i = 0;
        var data = "";
         while (i < noOfItems) {
           var theItems = items[i];
           var yearObj=theItems.getData("dept_branCode_attribKey");
           var branCode = yearObj.getValue();

   var deptObj=theItems.getData("dept_deptCode_attribKey");
           var deptCode = deptObj.getValue();

           var prodObj=theItems.getData("dept_incomeType_attribKey");
```

```
            var incometype = prodObj.getValue();


            var qObj=theItems.getData("dept_income__attribKey");

            var income = qObj.getValue();


            var mObj=theItems.getData("dept_size__attribKey");

            var sz = mObj.getValue();


            dataTable.addRow([branCode, deptCode, incometype, income, sz] );

            i = i + 1;

          }

    }

    else {

        alert("No data is available.");

    }


    return dataTable;

}

//get Employee data

function getEmployeeDetailData(args)

{

    var dataTable = new $MA.DataTable();

    dataTable.addColumn("branCode", "number");

    dataTable.addColumn("deptCode", "number");

    dataTable.addColumn("empCode", "number");

    dataTable.addColumn("incomeType", "string");

    dataTable.addColumn("branIncome", "number");

    dataTable.addColumn("bubbleSize", "number");


    //Get data from SUP MBO -- Employee

    var message = getCurrentMessageValueCollection();
```

```
var itemList = message.getData("Employee");

var items = itemList.getValue();

var noOfItems = items.length;

if (noOfItems > 0) {

    var i = 0;

    var data = "";


     while (i < noOfItems) {

       var theItems = items[i];

       var yearObj=theItems.getData("Employee_branCode_attribKey");

       var branCode = yearObj.getValue();


       var deptObj=theItems.getData("Employee_deptCode_attribKey");

       var deptCode = deptObj.getValue();


       var empObj=theItems.getData("Employee_empCode_attribKey");

       var empCode = deptObj.getValue();


       var prodObj=theItems.getData("Employee_incomeType_attribKey");

       var incometype = prodObj.getValue();


       var qObj=theItems.getData("Employee_income__attribKey");

       var income = qObj.getValue();


       var mObj=theItems.getData("Employee_size__attribKey");

       var sz = mObj.getValue();


       dataTable.addRow([branCode, deptCode, empCode, incometype, income, sz] );

       i = i + 1;

     }

}
```

```
    else {

        alert("No data is available.");

    }



    return dataTable;

}
```

Deploy the Workflow

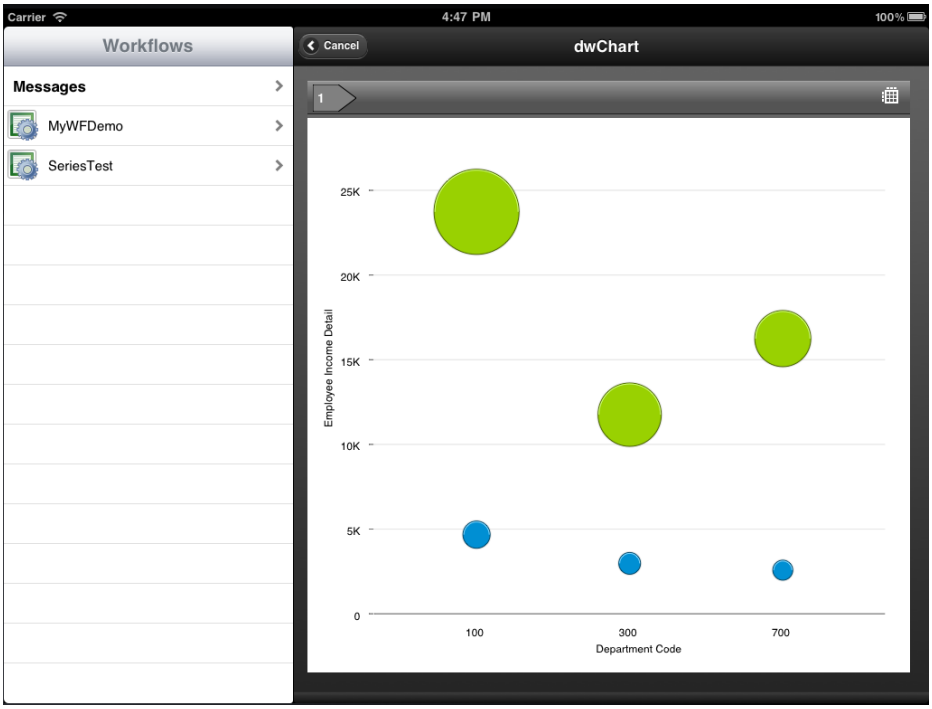
1. Right-click the workflow page and select **Generate Mobile Workflow Package**.
2. Keep the default settings.
3. Click **Finish**.

You should be able to show a workflow on your Unwired Server that shows a drilldown chart.

Note: If the app transits to the dwChart screen, you see three menu items—GetBranch, GetDept, and GetEmployee. To hide them, add this code to the **customBeforeShowScreen** function in `Custom.js`:

```
if (screenToShow === "dwChart") {

    removeMenuItem("dwChart", "GetBranch")

    removeMenuItem("dwChart", "GetDept")

    removeMenuItem("dwChart", "GetEmployee")

}
```

The drilldown chart looks similar to that shown below. Double-click any bubble in the chart to drill down to next level. To drill up, click the level buttons at the top-left corner.



System Requirements for the Unwired Platform Web Container

	Device	OS
iOS Workflow Client V2.1.2	iPad	iOS
Android Workflow Client V2.1.2	Motorola Xoom	Android
	Samsung Galaxy Tab 10.1	Android

Reference

SQL Statements for RevenueByY Table

```
/* create RevenueByY */

CREATE TABLE dba.RevenueByY  (

product NVARCHAR(20) NOT NULL,

year DOUBLE NOT NULL,

revenue DOUBLE NOT NULL,

);


/* insert sample data*/

INSERT INTO dba. RevenueByY  VALUES ("laptop",2005.0,2000.0);

INSERT INTO dba. RevenueByY  VALUES ("desktop",2005.0,1500.0);

INSERT INTO dba. RevenueByY  VALUES ("tablet",2005.0,1200.0);

INSERT INTO dba. RevenueByY  VALUES ("desktop",2006.0,1700.0);

INSERT INTO dba. RevenueByY  VALUES ("laptop",2006.0,2300.0);

INSERT INTO dba. RevenueByY  VALUES ("tablet",2006.0,1500.0);

INSERT INTO dba. RevenueByY  VALUES ("laptop",2007.0,2500.0);

INSERT INTO dba. RevenueByY  VALUES ("desktop",2007.0,1800.0);

INSERT INTO dba. RevenueByY  VALUES ("tablet",2007.0,1500.0);

INSERT INTO dba. RevenueByY  VALUES ("laptop",2008.0,2800.0);

INSERT INTO dba. RevenueByY  VALUES ("desktop",2008.0,2000.0);

INSERT INTO dba. RevenueByY  VALUES ("tablet",2008.0,1600.0);

INSERT INTO dba. RevenueByY  VALUES ("laptop",2009.0,2900.0);

INSERT INTO dba. RevenueByY  VALUES ("desktop",2009.0,2100.0);

INSERT INTO dba. RevenueByY  VALUES ("tablet",2009.0,2000.0);
```

```
INSERT INTO dba. RevenueByY  VALUES ("laptop",2010.0,2700.0);

INSERT INTO dba. RevenueByY  VALUES ("desktop",2010.0,1900.0);

INSERT INTO dba. RevenueByY  VALUES ("tablet",2010.0,2500.0);
```

SQL Statements for RevenueByQ Table

```
/* create table RevenueByQ */

CREATE TABLE dba.RevenueByQ (

product NVARCHAR(20) NOT NULL,

year DOUBLE NOT NULL,

quarter DOUBLE NOT NULL,

revenue DOUBLE NOT NULL,

);


/* insert sample data*/

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2005.0,1.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2005.0,1.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2005.0,1.0,200.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2005.0,2.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2005.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2005.0,2.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2005.0,3.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2005.0,3.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2005.0,3.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2005.0,4.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2005.0,4.0,700.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2005.0,4.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2006.0,1.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2006.0,1.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2006.0,1.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2006.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2006.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2006.0,2.0,300.0);
```

```
INSERT INTO dba.RevenueByQ  VALUES ("desktop",2006.0,3.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2006.0,3.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2006.0,3.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2006.0,4.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2006.0,4.0,900.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2006.0,4.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2007.0,1.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2007.0,1.0,100.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2007.0,1.0,200.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2007.0,2.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2007.0,2.0,800.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2007.0,2.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2007.0,3.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2007.0,3.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2007.0,3.0,200.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2007.0,4.0,800.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2007.0,4.0,1000.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2007.0,4.0,700.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2008.0,1.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2008.0,1.0,200.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2008.0,1.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2008.0,2.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2008.0,2.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2008.0,2.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2008.0,3.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2008.0,3.0,800.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2008.0,3.0,300.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2008.0,4.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2008.0,4.0,1200.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2008.0,4.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2009.0,1.0,500.0);
```

```
INSERT INTO dba.RevenueByQ  VALUES ("laptop",2009.0,1.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2009.0,1.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2009.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2009.0,2.0,800.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2009.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2009.0,3.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2009.0,3.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2009.0,3.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2009.0,4.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2009.0,4.0,1100.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2009.0,4.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2010.0,1.0,200.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2010.0,1.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2010.0,1.0,400.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2010.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2010.0,2.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2010.0,2.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2010.0,3.0,500.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2010.0,3.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2010.0,3.0,600.0);

INSERT INTO dba.RevenueByQ  VALUES ("desktop",2010.0,4.0,700.0);

INSERT INTO dba.RevenueByQ  VALUES ("laptop",2010.0,4.0,1100.0);

INSERT INTO dba.RevenueByQ  VALUES ("tablet",2010.0,4.0,1000.0);
```

SQL Statements for RevenueByM Table

```
/* create RevenueByM */

CREATE TABLE dba.RevenueByM (

product NVARCHAR(20) NOT NULL,

year DOUBLE NOT NULL,

quarter DOUBLE NOT NULL,

month DOUBLE NOT NULL,

revenue DOUBLE NOT NULL,
```

```
);


/* insert sample data*/
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,1.0,1.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,1.0,1.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,1.0,1.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,1.0,2.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,1.0,2.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,2.0,4.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,2.0,4.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,2.0,5.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,2.0,5.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,2.0,5.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,2.0,6.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,2.0,6.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,2.0,6.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,3.0,7.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,3.0,7.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,3.0,7.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,3.0,8.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,3.0,8.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,3.0,8.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,3.0,9.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,3.0,9.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,3.0,9.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,4.0,10.0,300.0);
```

```
INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,4.0,10.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,4.0,10.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,4.0,11.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,4.0,11.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,4.0,11.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2005.0,4.0,12.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2005.0,4.0,12.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2005.0,4.0,12.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,1.0,1.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,1.0,1.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,1.0,1.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,1.0,2.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,1.0,2.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,1.0,2.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,1.0,3.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,1.0,3.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,1.0,3.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,2.0,4.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,2.0,4.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,2.0,4.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,2.0,5.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,2.0,5.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,2.0,5.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,2.0,6.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,2.0,6.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,2.0,6.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,3.0,7.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,3.0,7.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,3.0,7.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,3.0,8.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,3.0,8.0,400.0);
```

```
INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,3.0,8.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,3.0,9.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,3.0,9.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,3.0,9.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,4.0,10.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,4.0,10.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,4.0,10.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,4.0,11.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,4.0,11.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,4.0,11.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2006.0,4.0,12.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2006.0,4.0,12.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2006.0,4.0,12.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,1.0,1.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,1.0,1.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,1.0,1.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,1.0,3.0,100.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,1.0,3.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,2.0,5.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,2.0,5.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,2.0,5.0,500.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,2.0,6.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,2.0,6.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,2.0,6.0,300.0);
```

```sql
INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,3.0,7.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,3.0,7.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,3.0,7.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,3.0,8.0,500.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,3.0,8.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,3.0,8.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,3.0,9.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,3.0,9.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,3.0,9.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,4.0,10.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,4.0,10.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,4.0,10.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,4.0,11.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,4.0,11.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,4.0,11.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2007.0,4.0,12.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2007.0,4.0,12.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2007.0,4.0,12.0,700.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,1.0,1.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,1.0,1.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,1.0,1.0,50.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,1.0,2.0,150.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,1.0,2.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,1.0,2.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,1.0,3.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,1.0,3.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,1.0,3.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,2.0,4.0,100.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,2.0,4.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,2.0,4.0,320.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,2.0,5.0,250.0);
```

```
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,2.0,5.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,2.0,5.0,320.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,2.0,6.0,350.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,2.0,6.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,2.0,6.0,320.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,3.0,7.0,350.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,3.0,7.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,3.0,7.0,480.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,3.0,8.0,450.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,3.0,8.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,3.0,8.0,460.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,3.0,9.0,500.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,3.0,9.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,3.0,9.0,430.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,4.0,10.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,4.0,10.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,4.0,10.0,580.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,4.0,11.0,500.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,4.0,11.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,4.0,11.0,620.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2008.0,4.0,12.0,550.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2008.0,4.0,12.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2008.0,4.0,12.0,660.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,1.0,1.0,230.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,1.0,1.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,1.0,1.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,1.0,2.0,250.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,1.0,2.0,210.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,1.0,3.0,270.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,1.0,3.0,200.0);
```

```
INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,1.0,3.0,280.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,2.0,4.0,350.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,2.0,4.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,2.0,4.0,270.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,2.0,5.0,340.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,2.0,5.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,2.0,5.0,320.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,2.0,6.0,350.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,2.0,6.0,300.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,2.0,6.0,310.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,3.0,7.0,480.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,3.0,7.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,3.0,7.0,470.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,3.0,8.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,3.0,8.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,3.0,8.0,470.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,3.0,9.0,460.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,3.0,9.0,400.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,3.0,9.0,430.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,4.0,10.0,630.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,4.0,10.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,4.0,10.0,640.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,4.0,11.0,620.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,4.0,11.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,4.0,11.0,620.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2009.0,4.0,12.0,610.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2009.0,4.0,12.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2009.0,4.0,12.0,680.0);

INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,1.0,1.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,1.0,1.0,200.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,1.0,1.0,200.0);
```

```
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,1.0,2.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,1.0,3.0,200.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,2.0,4.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,2.0,5.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,2.0,5.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,2.0,5.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,2.0,6.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,2.0,6.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,2.0,6.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,3.0,7.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,3.0,7.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,3.0,7.0,300.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,3.0,8.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,3.0,8.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,3.0,8.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,3.0,9.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,3.0,9.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,3.0,9.0,400.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,4.0,10.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,4.0,10.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,4.0,10.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,4.0,11.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,4.0,11.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,4.0,11.0,600.0);
INSERT INTO dba.RevenueByM  VALUES ("desktop",2010.0,4.0,12.0,600.0);
```

```
INSERT INTO dba.RevenueByM  VALUES ("laptop",2010.0,4.0,12.0,600.0);

INSERT INTO dba.RevenueByM  VALUES ("tablet",2010.0,4.0,12.0,600.0);
```

SQL Statements for EmpIncome Table

```
/* create EmpIncome */

CREATE TABLE dba.EmpIncome (

incomeType VARCHAR(20) NOT NULL,

branCode INT NOT NULL,

deptCode INT NOT NULL,

empCode INT NOT NULL,

income DOUBLE NOT NULL,

size INT NOT NULL,

)

IN SYSTEM

;



/* Insert sample data */

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,1000,10000.0,100);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,1000,1000.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,1001,2000.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,1001,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,3000,1000.0,200);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,3000,800.0,100);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,4000,6000.0,80);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,4000,400.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,7000,1200.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,7000,100.0,20);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,8000,1500.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,8000,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,9000,700.0,120);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,9000,300.0,10);

INSERT INTO dba.EmpIncome  VALUES ("Salary",1,100,10000,1300.0,40);
```

```
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,100,10000,400.0,20);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,300,10,2000.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,300,10,800.0,50);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,300,3500,1000.0,200);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,300,3500,800.0,100);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,300,4000,6000.0,80);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,300,4000,400.0,30);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,300,7500,1200.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,300,7500,100.0,20);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,300,8000,1500.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,300,8000,800.0,50);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,700,105,2000.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,700,105,800.0,50);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,700,410,1000.0,200);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,700,410,800.0,100);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,700,530,6000.0,80);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,700,530,400.0,30);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,700,720,6000.0,80);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,700,720,400.0,30);
INSERT INTO dba.EmpIncome  VALUES ("Salary",1,700,1000,1200.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",1,700,1000,100.0,20);
INSERT INTO dba.EmpIncome  VALUES ("Salary",2,200,1001,2000.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,200,1001,800.0,50);
INSERT INTO dba.EmpIncome  VALUES ("Salary",2,200,3000,1000.0,200);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,200,3000,800.0,100);
INSERT INTO dba.EmpIncome  VALUES ("Salary",2,200,4000,6000.0,80);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,200,4000,400.0,30);
INSERT INTO dba.EmpIncome  VALUES ("Salary",2,400,7000,1200.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,400,7000,100.0,20);
INSERT INTO dba.EmpIncome  VALUES ("Salary",2,400,8000,1500.0,150);
INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,400,8000,800.0,50);
```

```sql
INSERT INTO dba.EmpIncome  VALUES ("Salary",2,400,9000,700.0,120);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,400,9000,300.0,10);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,400,10000,1300.0,40);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,400,10000,400.0,20);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,400,10,2000.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,400,10,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,800,300,1000.0,200);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,800,300,800.0,100);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,800,1000,6000.0,80);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,800,1000,400.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,800,7500,1200.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,800,7500,100.0,20);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,800,8000,1500.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,800,8000,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",2,800,9000,2000.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,800,8000,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,300,1001,3000.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,300,1001,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,300,3000,1000.0,300);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,300,3000,800.0,100);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,300,4000,6000.0,80);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,300,4000,400.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,400,7000,1300.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,400,7000,100.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,400,8000,1500.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,400,8000,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,400,9000,700.0,130);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",2,400,9000,300.0,10);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,400,10000,1300.0,40);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,400,10000,400.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,400,10,3000.0,150);
```

```
INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,400,10,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,800,300,1000.0,300);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,800,300,800.0,100);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,800,1000,6000.0,80);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,800,1000,400.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,800,7500,1300.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,800,7500,100.0,30);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,800,8000,1500.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,800,8000,800.0,50);

INSERT INTO dba.EmpIncome  VALUES ("Salary",3,800,9000,3000.0,150);

INSERT INTO dba.EmpIncome  VALUES ("Bonus",3,800,8000,800.0,50);
```