

## Using Microsoft Dynamics CRM for Analytical CRM: A Curriculum Package for Business Intelligence or Data Mining Courses

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**Abstract:** The purpose of this curriculum package attempts to show how to use the Microsoft SQL Server Business Intelligence Development Studio to access Microsoft Dynamics CRM and conduct a data mining and analysis. First, students use the Dynamics CRM 2013 to input sales data (lead and opportunity). Second, students use SQL Server Business Intelligence Development Studio to analyze the data to find out the relationship between lead and opportunity. The mining models used in the assignment are: decision tree, clustering, Naïve Bayes, and logistic regression. Finally, students can decide which mining mode is good and what customers have the highest possibility to transfer from lead phase to opportunity phase.

### INTRODUCTION

Business intelligence and analytical CRM are popular topics in the MIS curriculum today. The purpose of this curriculum package attempts to show how to use the Microsoft SQL Server Business Intelligence Development Studio to access Microsoft Dynamics CRM and conduct a data mining and analysis. First, students use the Dynamics CRM 2013 to input sales data (lead and opportunity). Second, students use SQL Server Business Intelligence Development Studio to analyze the data to find out the relationship between lead and opportunity. The mining models used in the assignment are: decision tree, clustering, Naïve Bayes, and logistic regression. Finally, students can decide which mining mode is good and what customers have the highest possibility to transfer from lead phase to opportunity phase

The assignment requires Microsoft Dynamics CRM 2013 but it can be transferred to Dynamics CRM 2015 with a minimum modification. The Dynamics CRM portion can be done online or on premise. The SQL Server portion can be done online or on premise but it is best done in a local area network environment for security consideration.

## ORGANIZATION OF THIS CURRICULUM PACKAGE

This curriculum package is showed in the following sequences:

- I. Outline of for the class
- II. Reading Materials before the class, and
- III. Materials during the class.

### I. Outline (Agenda) for the Class

#### A. Lecture (15 – 20 minutes)

1. Introduction to business intelligence&Analytical CRM
2. Major CRM and BI systems
3. Why do we choose Microsoft Dynamics CRM for business intelligence courses?
4. Built-in BI features in Microsoft Dynamics CRM
5. Link Microsoft Dynamics CRM and SQL Server Business Intelligence Development Studio
6. The Dashboard in Microsoft Dynamics CRM
7. Analytical CRM and mobile devices

#### B. Step-by-step Hands-on Exercises (40 – 45 minutes)

1. Create Leads and Opportunities using Microsoft Dynamics CRM systems (15 minutes)
2. Use in Microsoft SQL Server Development Studio to access Microsoft Dynamics CRM (25 minutes)
3. Discussion for the results (5 minutes)

## II. Reading Materials before the Class

### A. Required Reading

1. Students are required to read the following book about business intelligence (Chapter 6), and customer relationship management (Chapter 8).

**Paige Baltzan, Business Driven Information Systems, 3rd Edition, McGraw-Hill Irwin, 2012, ISBN:0073376825**

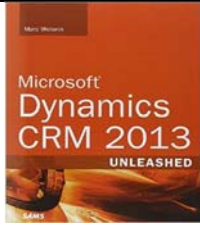
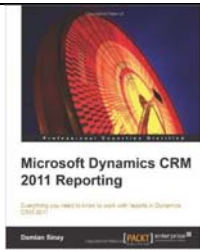

[http://highered.mcgraw-hill.com/sites/0073376825/information\\_center\\_view0/](http://highered.mcgraw-hill.com/sites/0073376825/information_center_view0/)

2. Read the first chapter of the following book and understand the features of Microsoft Dynamics CRM: Marc J. Wolenik, *Microsoft Dynamics CRM 2013 Unleashed*, Sams Publishing; 1stEdition, May 9, 2014, ISBN-13: 978-0672337031

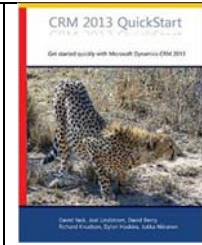
### B. Optional Reading

You can browse the Internet to look the following books, video clips, or articles but it is not required:

#### B1. Books

<p>1. Marc J. Wolenik, <i>Microsoft Dynamics CRM 2013 Unleashed</i>,</p>	
<p>2. Damian Sinay, <i>Microsoft Dynamics CRM 2011 Reporting and Business Intelligence</i></p>	
<p>3. Alok Singh and Sandeep Chanda, <i>Microsoft Dynamics CRM 2013 Marketing Automation</i></p>	

4. David Berry et al., CRM 2013 QuickStart, We Speak You Learn, LLC (July 10, 2014)



## B.2 Video

1. Dynamics CRM in YouTube.  
<https://www.youtube.com/user/msdyncomm/DynamicsCRM>
2. CRM Business Intelligence - Demonstrating Microsoft Dynamics Charts & Dashboards  
<https://www.youtube.com/watch?v=Vjp8KCQRVc8>
3. Lori Harner et al., Microsoft Dynamics Webcast: Business Intelligence for Microsoft Dynamics CRM  
<https://msevents.microsoft.com/CUI/EventDetail.aspx?culture=en-US&EventID=1032398028&CountryCode=US>  
(download is required)

## B.3 Others (online)

1. Create custom reports using Business Intelligence Development Studio  
[https://technet.microsoft.com/en-us/library/dn531151\(v=crm.6\).aspx](https://technet.microsoft.com/en-us/library/dn531151(v=crm.6).aspx)
2. The Indispensable Guide to Chart Design and Data Visualization – Part 1  
<http://www.zapbi.com/Community/TipsandTricks/Article/tabid/585/ArticleID/18/The-Indispensable-Guide-to-Chart-Design-and-Data-Visualization-Part-1.aspx>

## III. Materials Used during the Class

### A. PowerPoint Slides

### B. Step-by-Step Hands-on Exercises

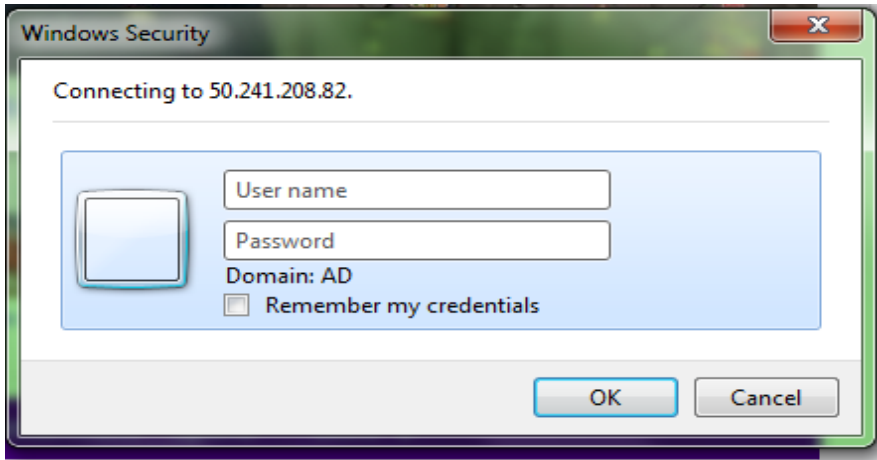
#### B.1 How to access Microsoft Dynamics CRM 2013 (5 minutes)

##### B.1.1 The Objective of the Assignment

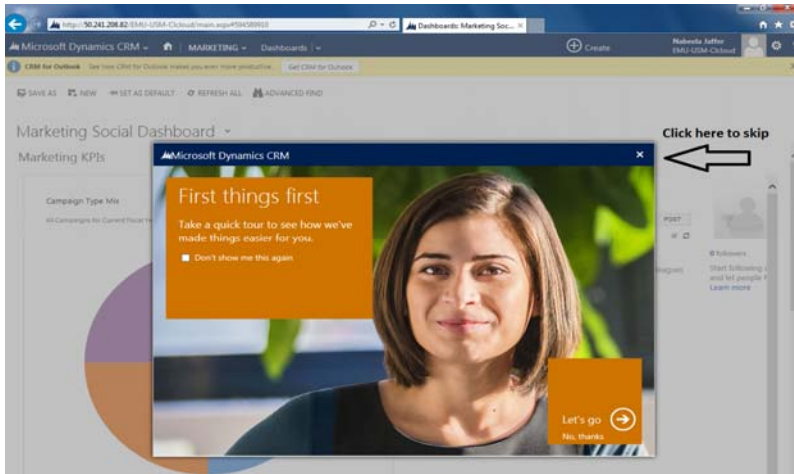
1. How to access Microsoft Dynamics CRM 2013.
2. Know the website, user id, and password to access Microsoft Dynamics CRM 2013 Online.
3. You can also contact DYNAA for set up a one-semester account. Please contact [dynaa@microsoft.com](mailto:dynaa@microsoft.com)

##### B.1.2 Access Microsoft Dynamics CRM2013

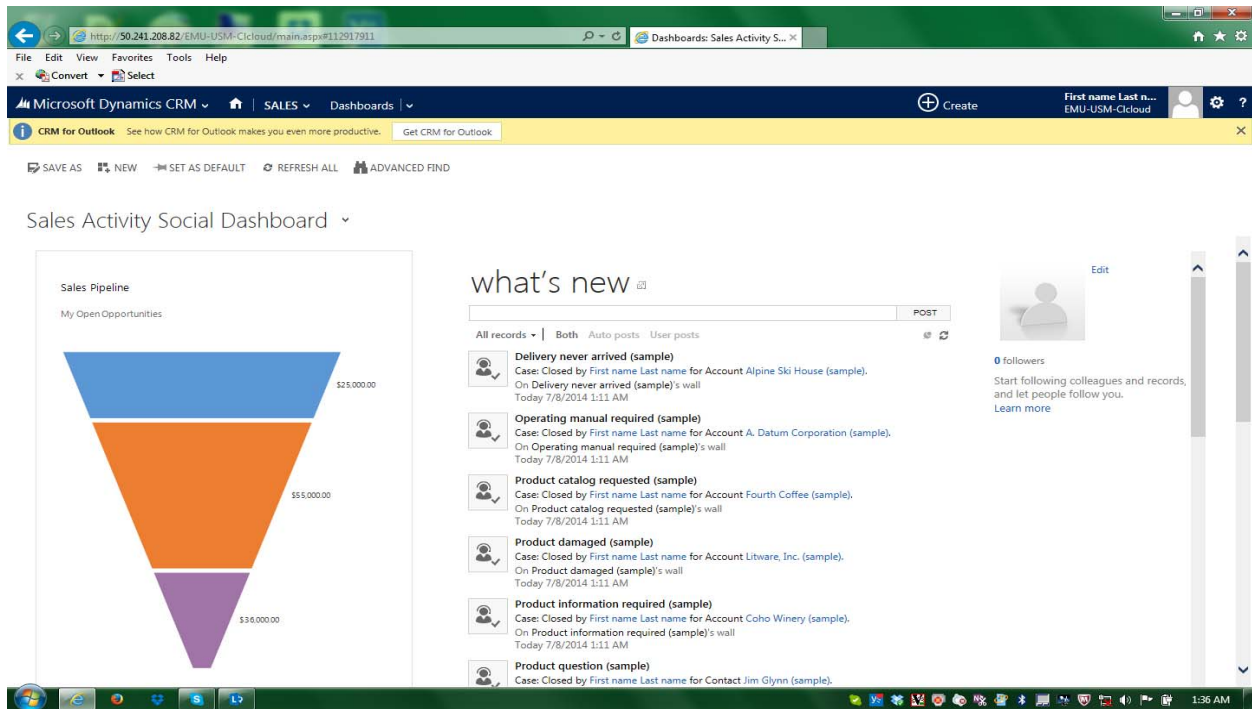
1. Make sure that the computer has an active Internet connection and ensure that you use Internet Explorer to access Microsoft Dynamics CRM.
2. In the Internet Explorer, go to <http://crm.clcloud.com>
3. If you do not see the following screen but a denial message, click the refresh button on Internet Explore. If you see the following screen, login into Dynamics CRM using the user id and password provided by the professor:



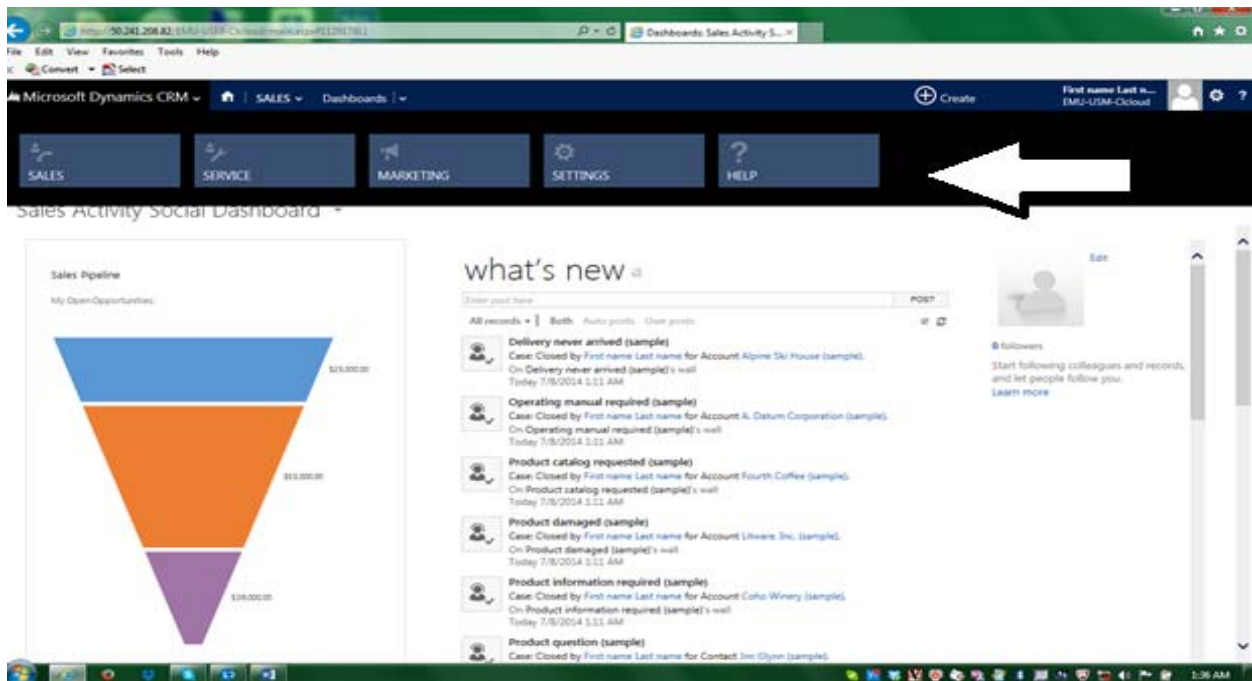
- 4. It may take 2-3 minutes if you use it for the first time.
- 5. You should see the following screen:



Click the  as shown in the above picture to skip the "First things first" and you will see the following screen.



The menu structure is organized as the following picture:



Answer the following questions:

- 1) List four sub menu items in Marketing (the third item in main menu)
- 2) List at least 3 sub menu items in Sales

**B.2 Sales Modules (15 minutes)**


**B.2.1 The Objective of the Assignment**

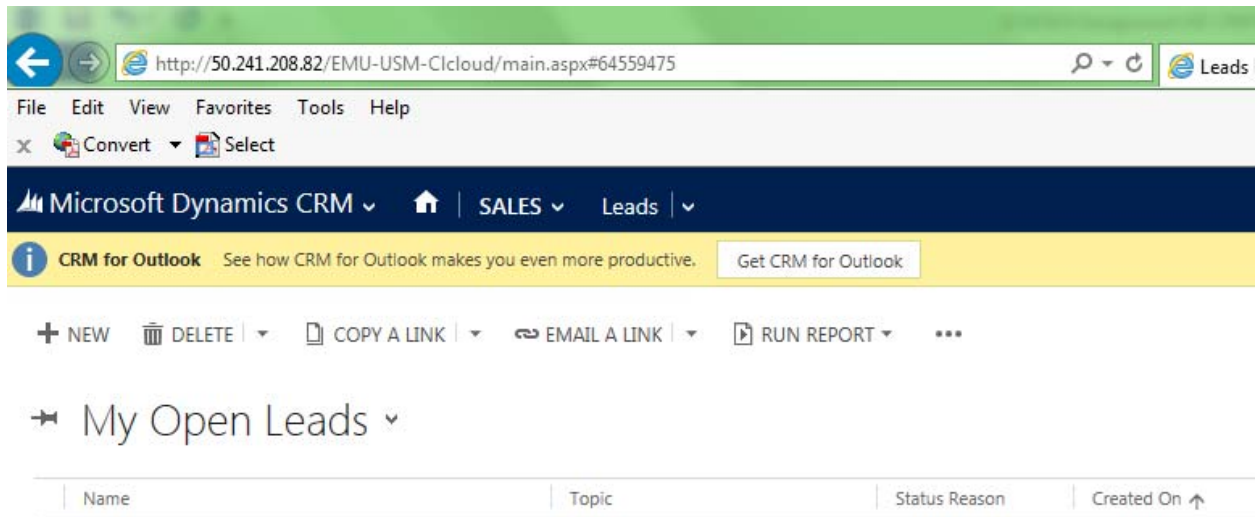
1. Understand sales features of Microsoft Dynamics CRM online
2. Understand Sales Process Management
3. Explain the concept of the sales processes in Microsoft Dynamics CRM

**B.2.2 Step-by-step Exercises**

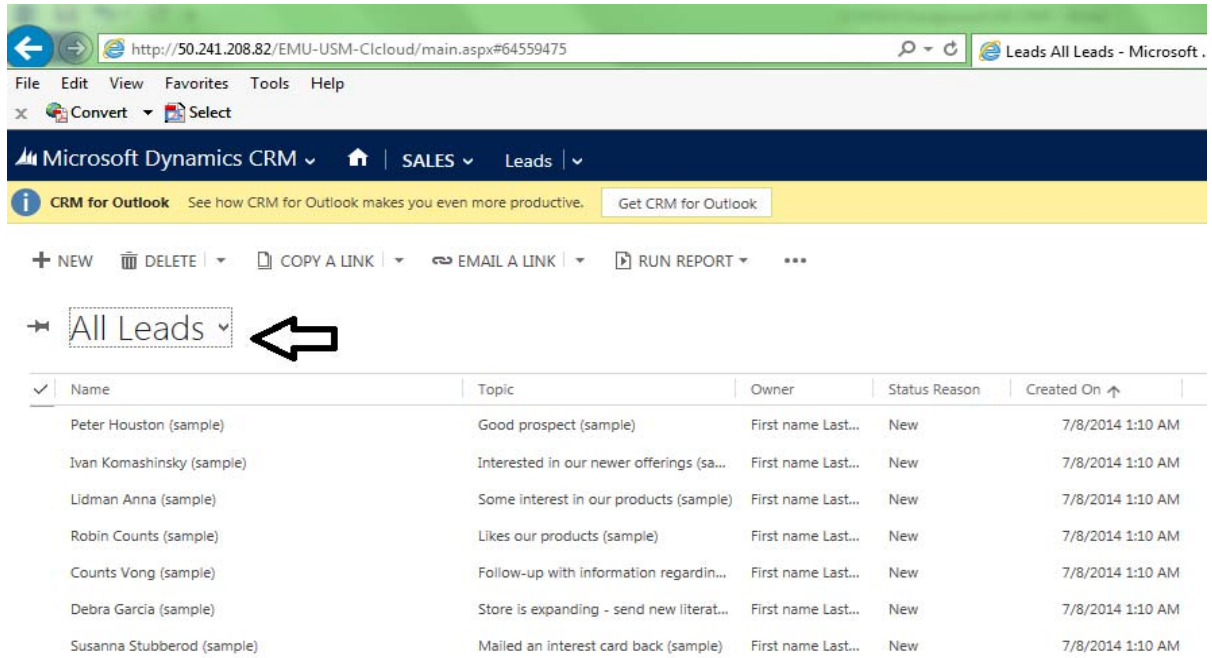
A sales representative wants to know his potential customers and see whether they can be converted to real customers. The potential customers expressed their interest before and have been recorded in CRM systems as leads. The sales representative (You will act as the sales representative in the exercise) will use Dynamics CRM 2013 to do it.

What is the meaning of the Leads under Sales?

1. Click  in the main menu, then click **Sales** -> click **Leads**. You will see “My Open Leads” but you may not see any leads

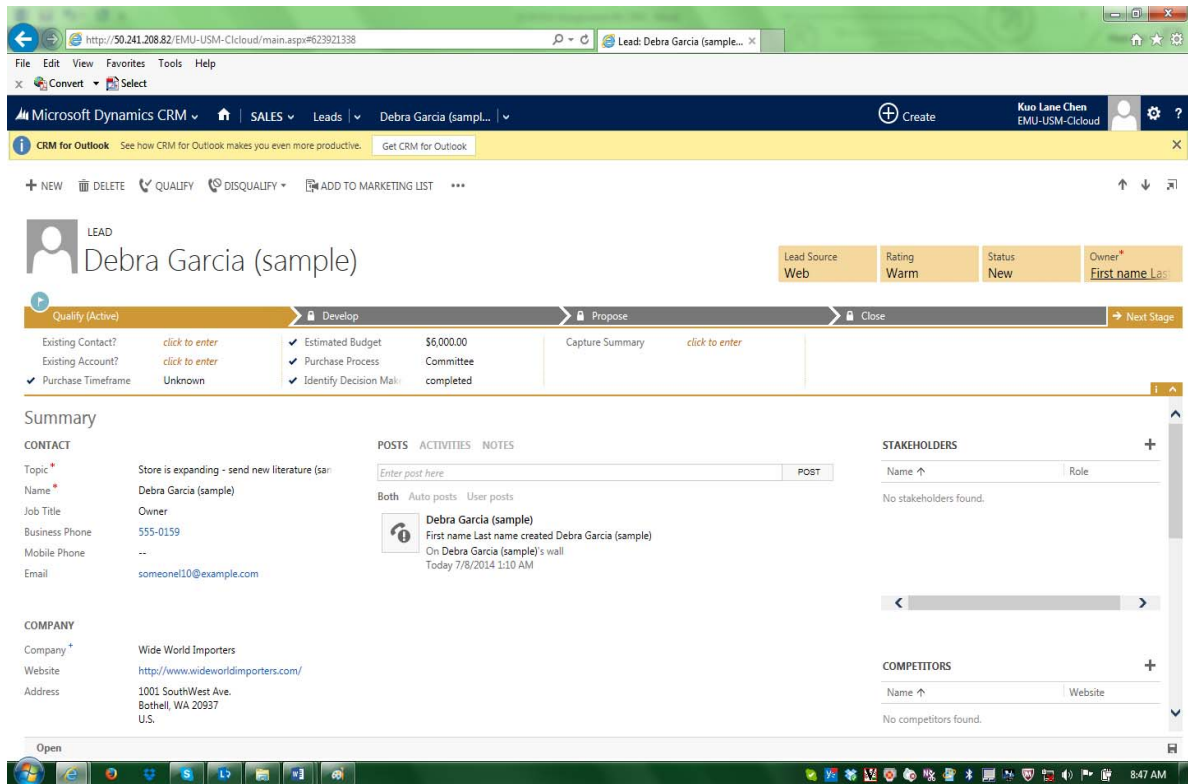


Change “My Open Leads” to “All Leads” then you will see all the leads.



Change “All Leads” to “Open Leads” and “Close Leads”. What is the difference between open leads and close leads?

- Leads are potential customers for your company. In the list of leads, one of them is Debra Garcia. After review her profile and contact her (See the following picture), you believe that she can be converted to Opportunity.



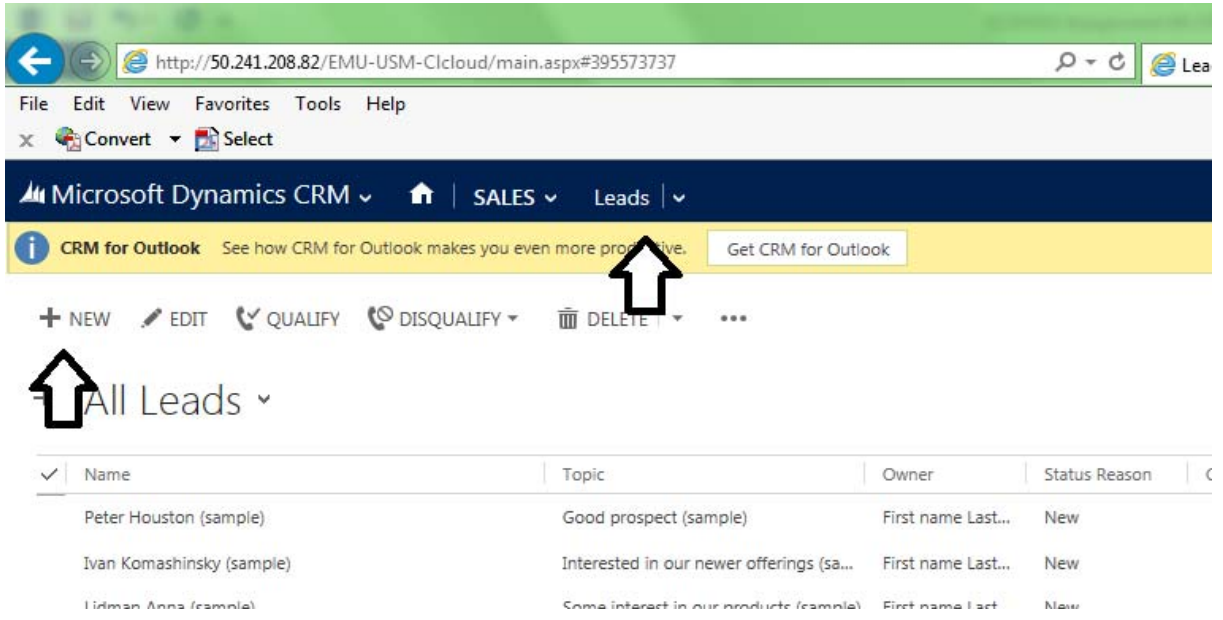


Move the screen down and you can see a map. Click the map and you will expand the map

Close the Bing map.

Return to previous screen and close the profile for Debra.

3. Create a new lead: click New as follows:



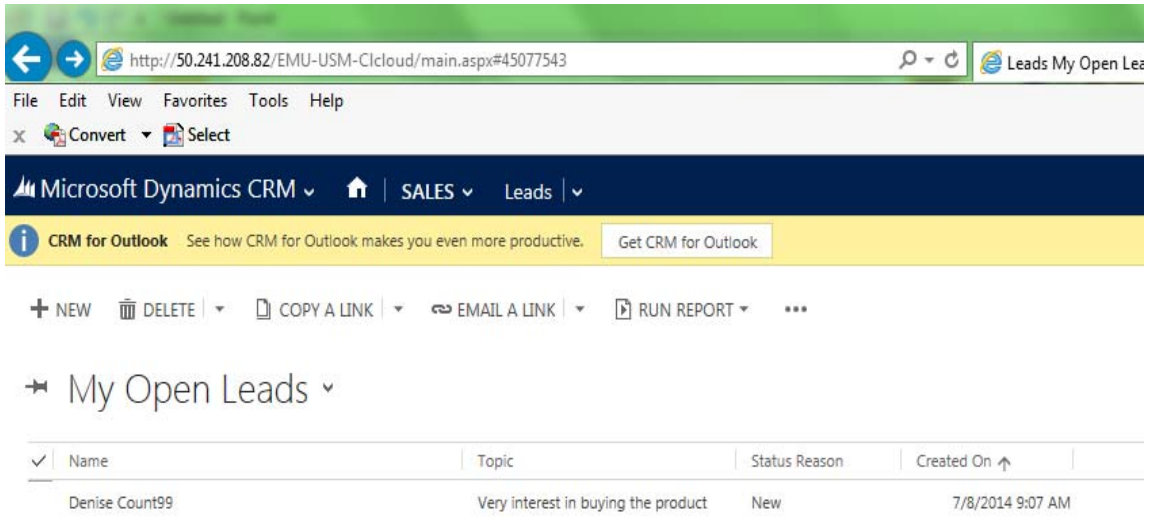
Enter the following information:

Topic: Interested in buying the product  
Name: Kara Mchen+1xx (xx is your number)

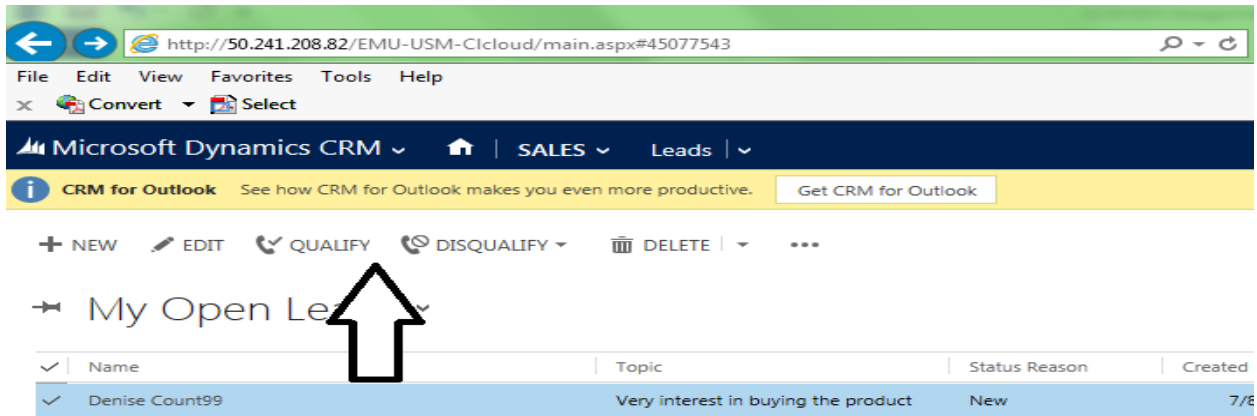
Company: Clcloud+1xx (xx is your number)

Click **Save**.

Now check My Open Lead, see whether you can see it



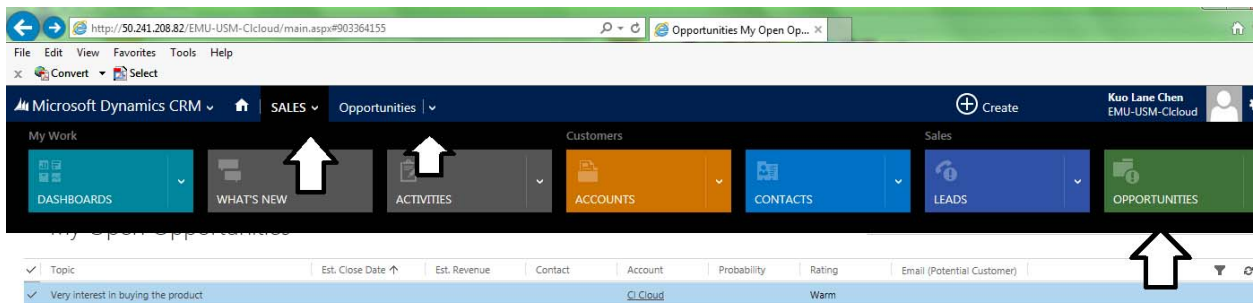
4. Put a check mark on Kara Mchenlxx and click Qualify.



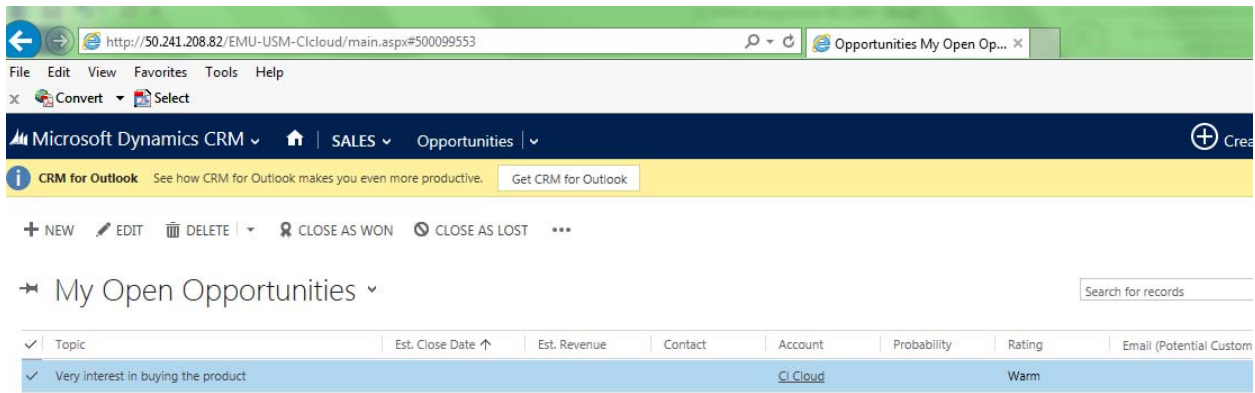
The Michenlxx's name is disappeared because she is moved to the list of the opportunity.

### Opportunity

Go to Opportunity (Sales -> Opportunities on the menu) as follows:

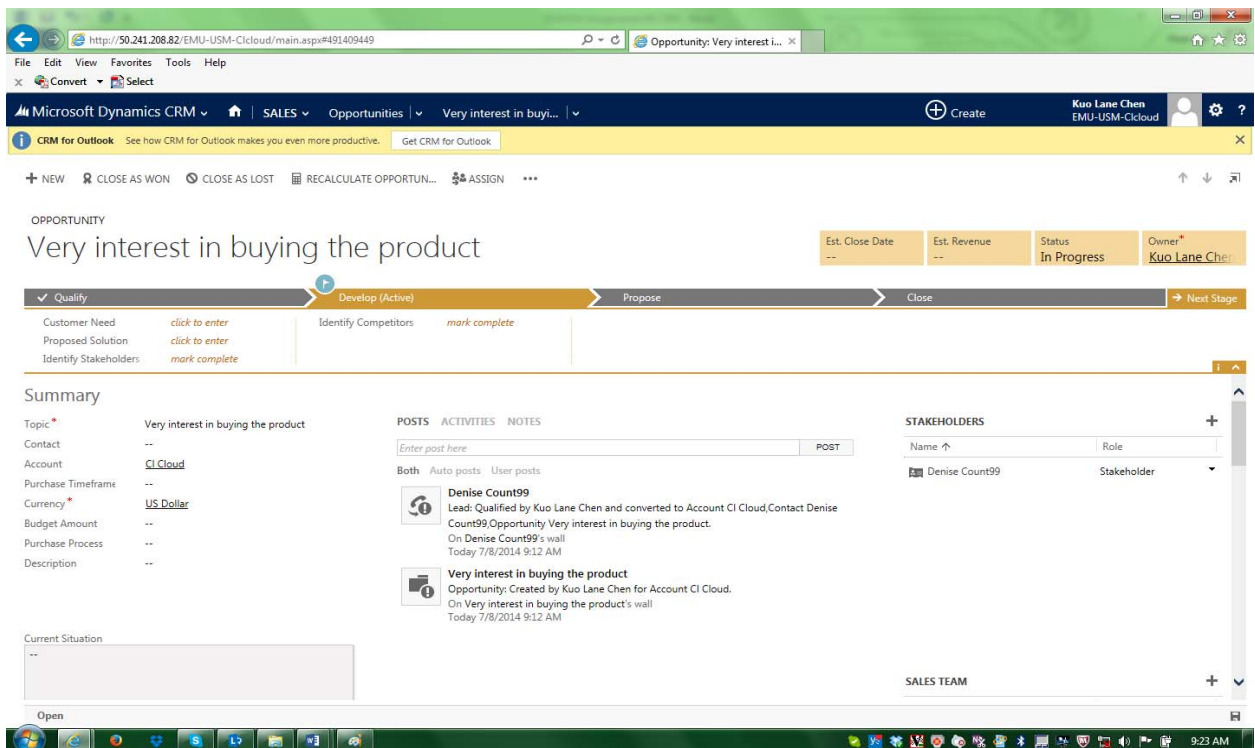


You will see the following screen:



What is the rating for Kara Mchen1XX?

Click Kara Mchen1XX. You will see the following similar screen:



Click Close as Won. You will see the following screen:

Close Opportunity

Provide the following information about why this opportunity is being closed.

Status Reason \* Won

Actual Revenue \* \$0.00

Close Date \* 1/23/2015

Competitor

Description

OK Cancel




Put \$250 in the Actual Revenue and click OK. You may see something similar to the following

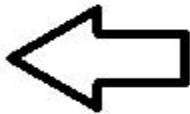
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**POSTS** ACTIVITIES NOTES

Enter post here POST

Both Auto posts User posts

-  **very intrested in buying the prouduct**  
SCM FS042 won Opportunity for Account CCloud26: \$250.00.  
Congratulations!  
On very intrested in buying the prouduct's wall  
Today 1/23/2015 9:58 PM
-  **very intrested in buying the prouduct**  
Opportunity: Created by SCM CL026 for Account CCloud26.  
On very intrested in buying the prouduct's wall  
11/18/2014 10:58 AM
-  **Denise CountS26**  
Lead: Qualified by SCM CL026 and converted to Account  
CCloud26,Contact Denise CountS26,Opportunity very intrested in buying  
the prouduct.  
On Denise CountS26's wall  
11/18/2014 10:58 AM



Provide a screenshot to prove that you have done this portion of the assignment.

### B3. Use Business Intelligence Development Studio to Access CRM Database (20 minutes)

#### B.3.1 The Objective of the Assignment

The purpose of this assignment is to show how to use Business Intelligence Development Studio to access CRM database in SQL Server. We try to find out what type of customers has the higher possibility to transfer from leads to opportunities than other types of customers.

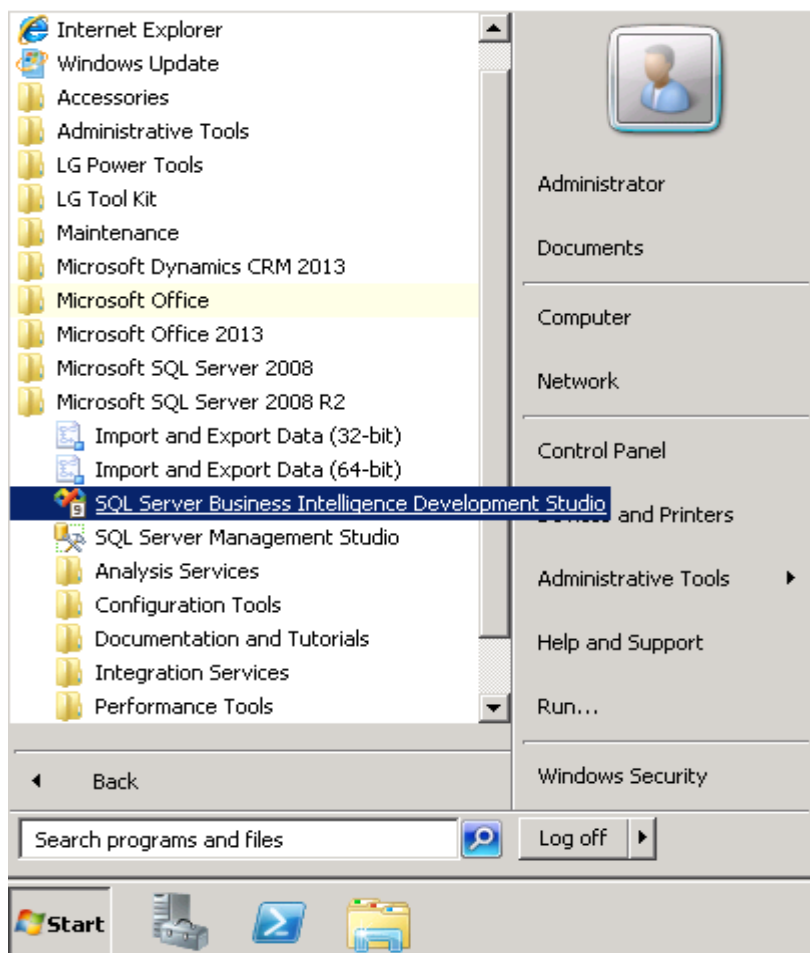
#### B.3.2 Step-by-Step Assignments

##### B.3.2.1 Creating an Analysis Services Project for Microsoft Dynamics CRM Database

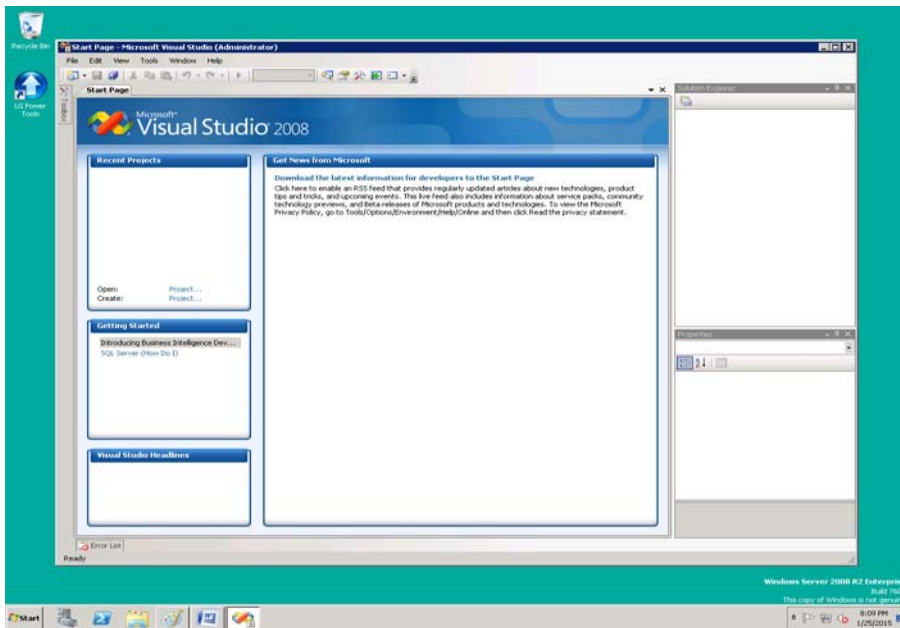
“A Microsoft SQL Server Analysis Services (SSAS) project defines the schema for the objects in a single Analysis Services database. The Analysis Services database is defined by the mining models, OLAP cubes, and supplemental objects that it contains. Students in this exercises operates the server in a local area network environment or using remote desktop to access the server.”\* (Microsoft MSDN)

##### 3.2.1.1 To create an Analysis Services project for CRM Database

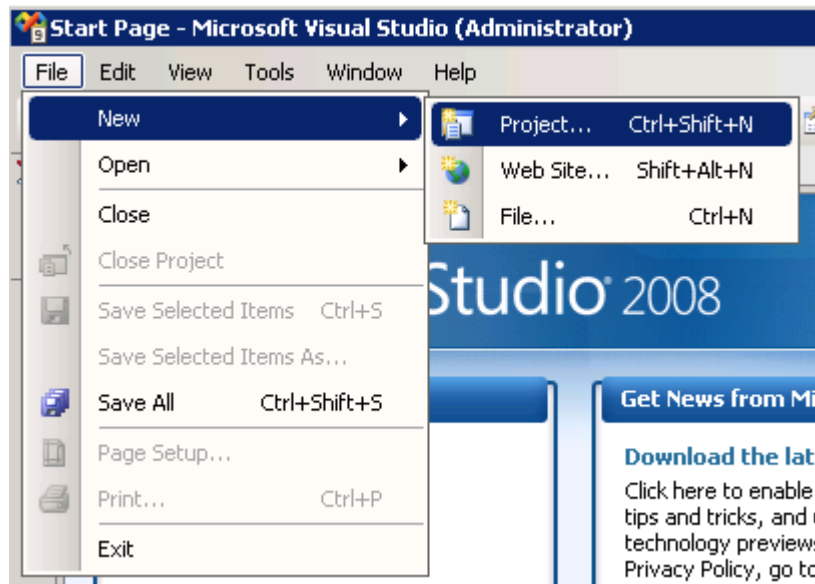
1. Start-> All Programs -> Microsoft SQL Server 2008 ->SQL Server Business Intelligence Development Studio.



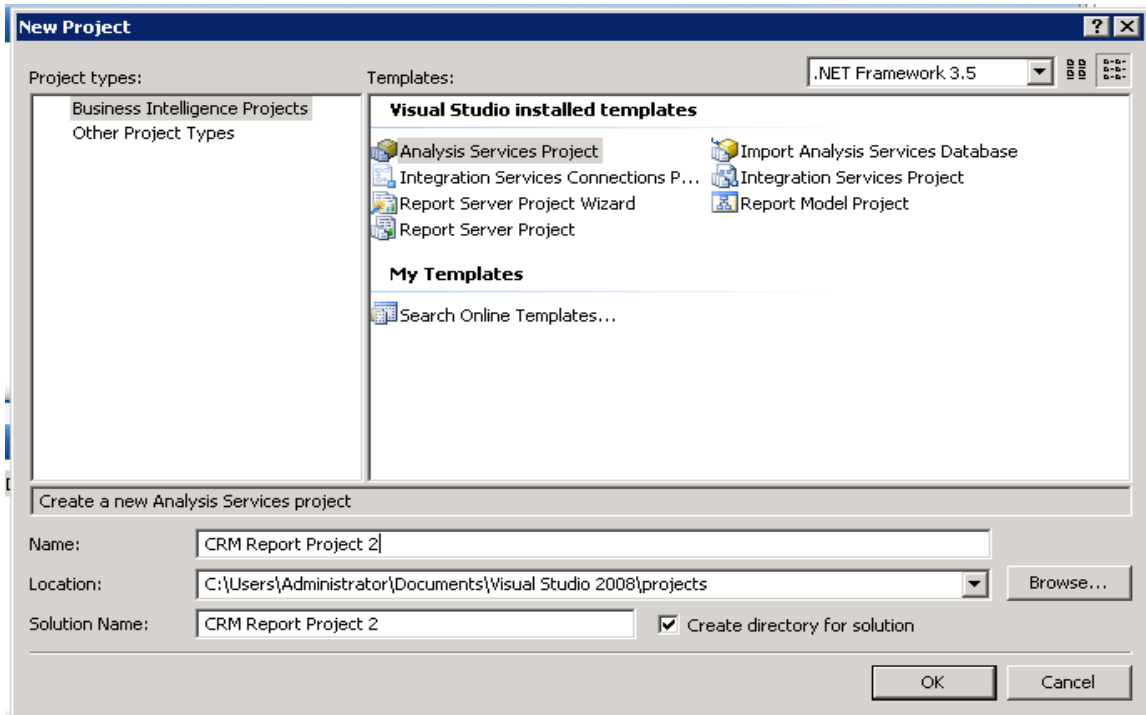
- The following screen appear:



- On the **File** menu, point to **New**, and then select **Project** as follows:



- Verify that **Analysis Services Project** is selected in the **Templates** pane.
- In the **Name** box, name the new project “CRM Report Project 2” or any other names assigned by the instructor (See below).



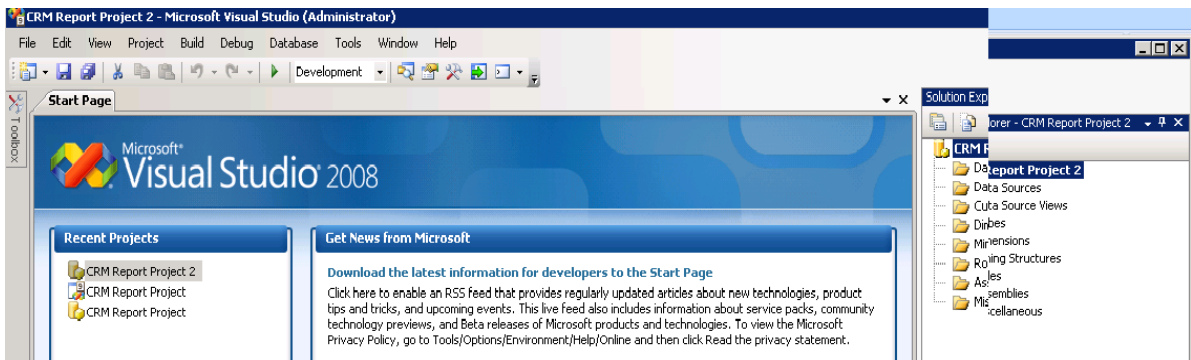
### 3.2.1.2 Creating a Data Source

“A data source is a data connection that is saved and managed within your project and deployed to your Microsoft SQL Server 2008 Analysis Services (SSAS) database. The data source contains the server name and database where your source data resides, in addition to any other required connection properties.”\* (Microsoft MSDN)

To create a data source

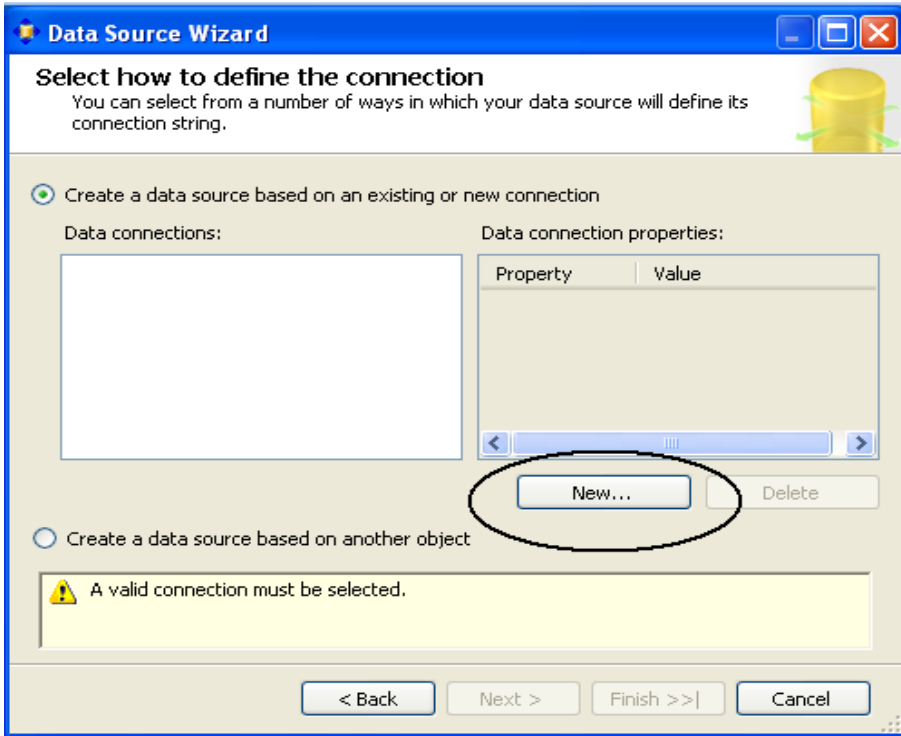
1. In Solution Explorer, right-click the **Data Sources** folder and select **New Data Source**.

The Data Source Wizard opens.



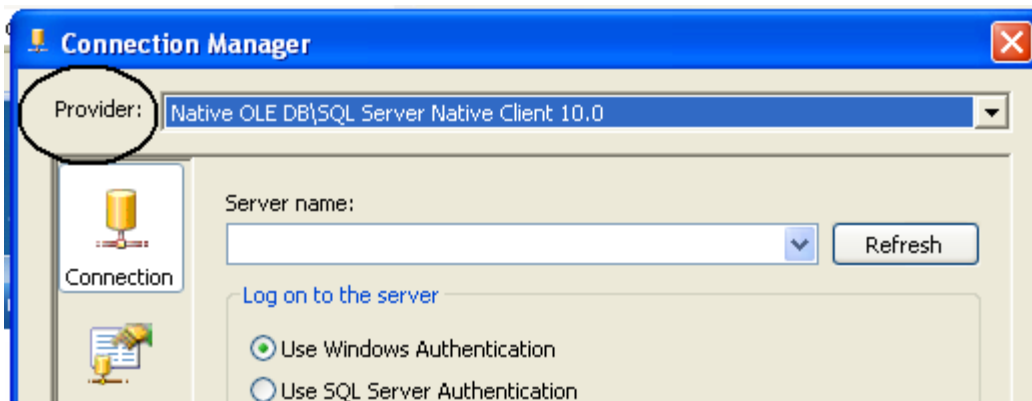


2. On the **Welcome to the Data Source Wizard** page, click **Next**.
3. Click **New** to add a connection to the Adventure Works database.

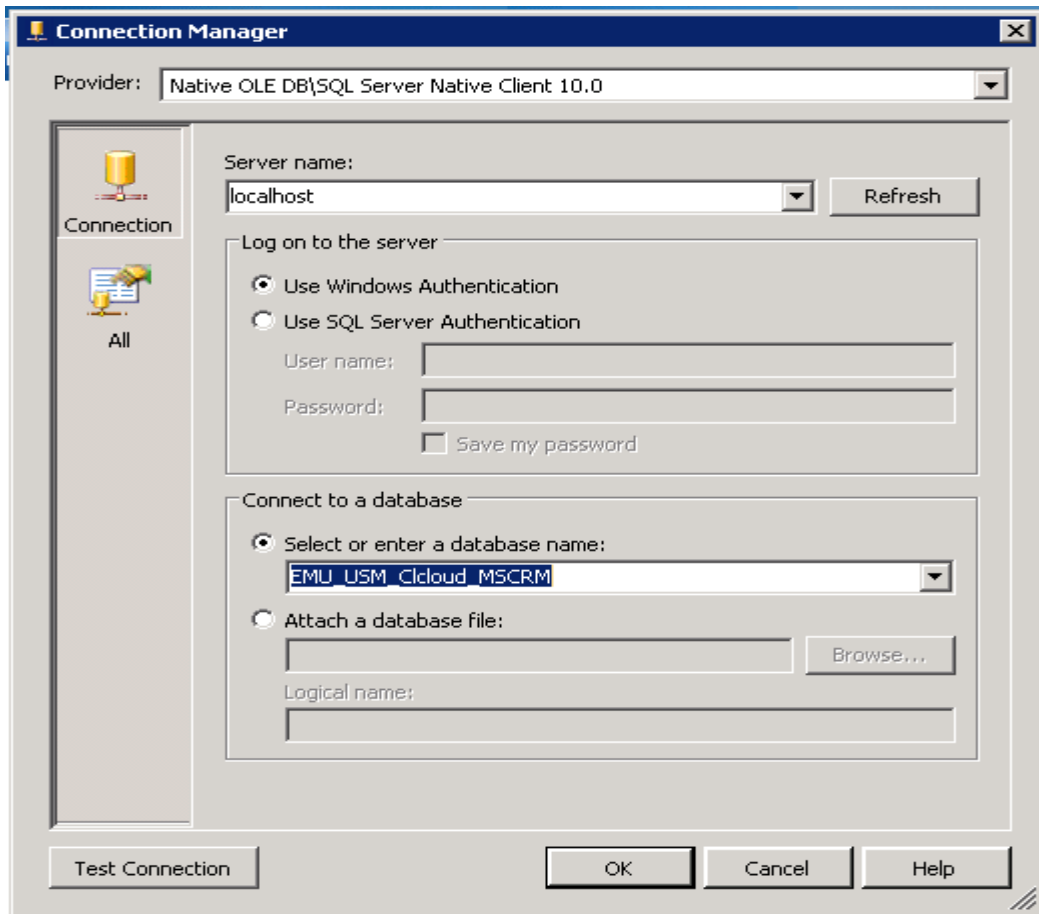


The **Connection Manager** dialog box opens.

4. In the **Provider** list in **Connection Manager**, select **Native OLE DB\SQL Server Native Client 10.0**.



5. In the **Server name** text box, type **localhost**.
6. Verify that **Use Windows Authentication** is selected. In the **Select or enter a database name** list, select **EMU\_USM\_Clcloud\_MSCRM** as the database name.



7. Click **Test Connection** to test the connection to the database.
8. Click **OK**, and then click **Next**.
9. On the **Impersonation Information** page of the wizard, select **Use the service account**, and then click **Next**.
10. On the **Completing the Wizard** page, type the name EMU\_USM\_Ccloud\_MSCRM (or the name assignment by your instructor) and then click **Finish** to create the new data source.

The new data source, EMU\_USM\_Ccloud\_MSCRM.ds, appears in the **Data Sources** folder in Solution Explorer.

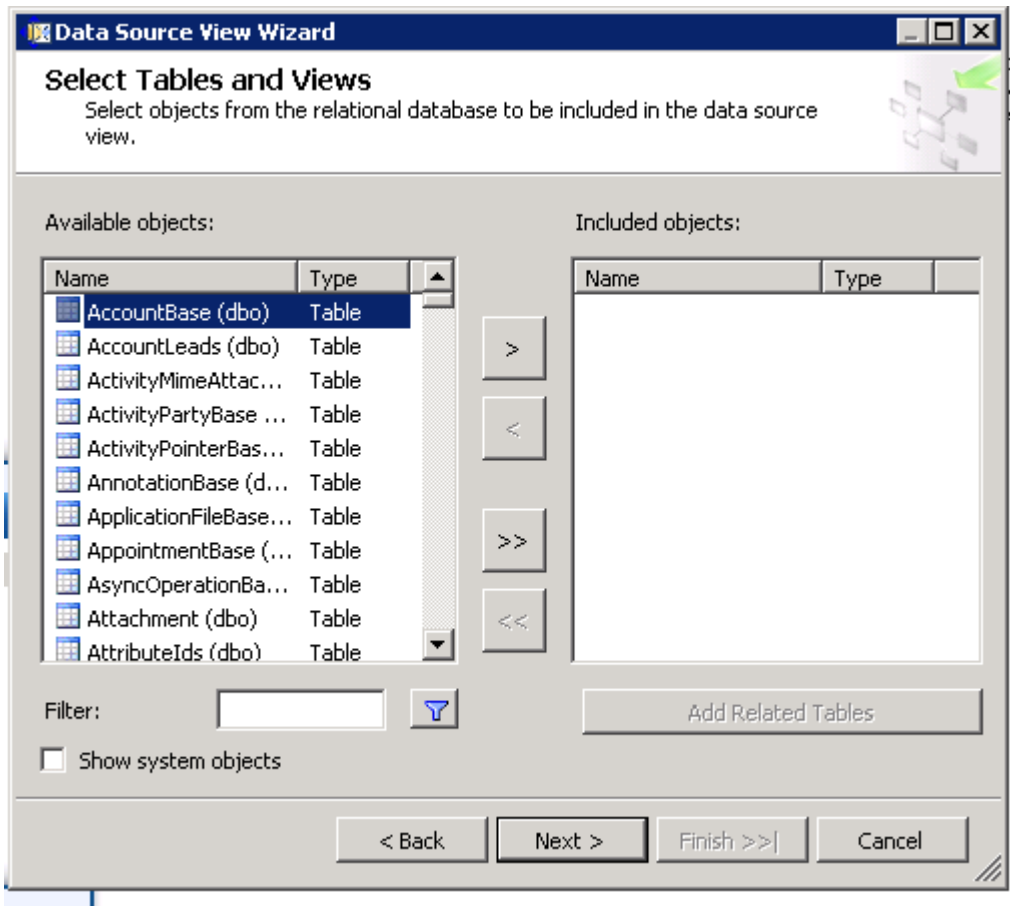
### 3.2.1.3 Creating a Data Source View

“A data source view provides an abstraction of the data source. This lets you modify the structure of the data to make it more relevant to your project. By using data source views, you can select the tables that relate to your particular project, establish relationships between tables, and add calculated columns and named views without modifying the original data source.”\* (Microsoft MSDN)

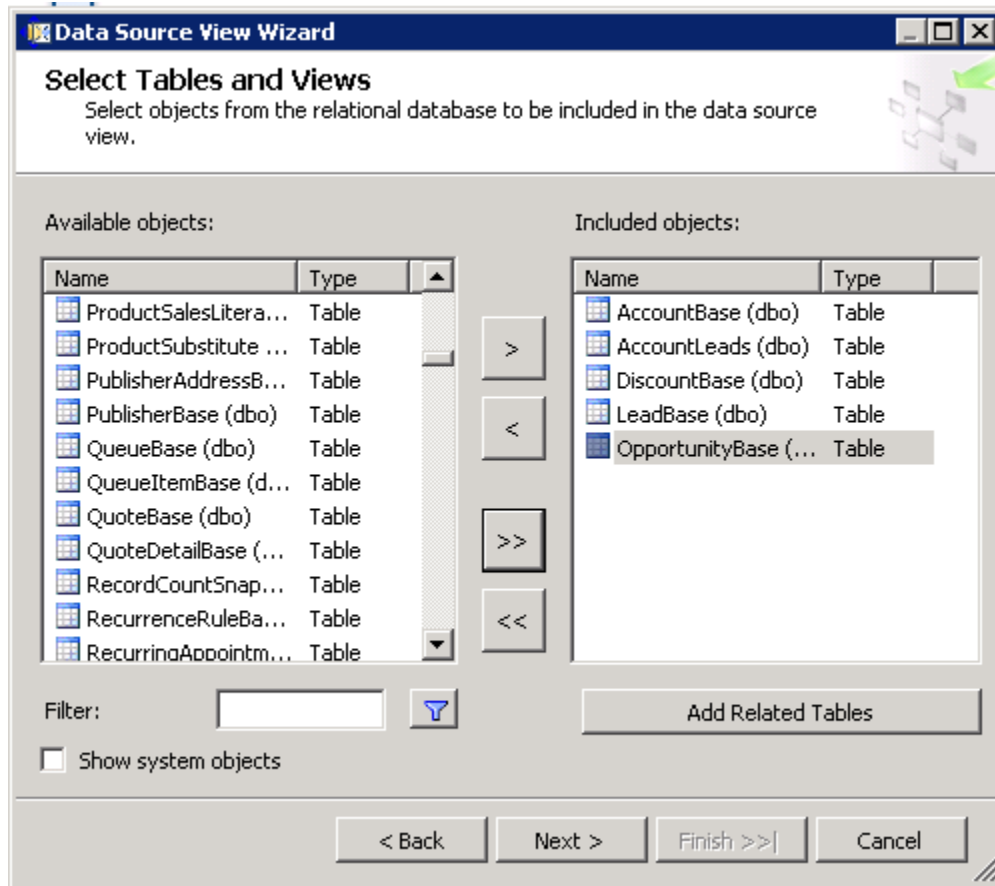
To create a data source view

1. In Solution Explorer, right-click **Data Source Views**, and select **New Data Source View**.

The Data Source View Wizard opens as follows.



2. On the **Welcome to the Data Source View Wizard** page, click **Next**.
3. On the **Select a Data Source** page, by default the EMU\_USM\_Cloud\_MSCRM data source that you created in the last task is selected under **Relational data sources**. Click **Next**.
4. On the **Select Tables and Views** page, select the following tables, and then click the right arrow to include them in the new data source view:
  - **AccountBase (dbo)**
  - **AccountLeads (dbo)**
  - **DiscountBase (dbo)**
  - **LeadBase(dbo)**
  - **OpportunityBase(dbo)**



5. Click **Next**.
6. On the **Completing the Wizard** page, by default the data source view is named EMU\_USM\_Clcloud\_CRM. Click **Finish**.  
Data Source View Designer opens to display the EMU\_USM\_Clcloud\_CRM data source view.

#### 3.2.1.4 Mining Model: Building a Targeted Customers for Mail or E-mail

##### Objective

“The marketing department wants to increase sales by targeting specific customers for a mailing or e-mail campaign. By investigating the attributes of known customers, the company hopes to discover patterns that they can then transfer potential customers from lead to opportunity. They hope to use the discovered patterns to predict which potential customers are most likely to transfer from lead to opportunity or purchase from the company.”\* (Microsoft MSDN).

The Microsoft Dynamics CRM's database, contains a list of customers (lead) and a list of highly potential customers (opportunity). In this assignment you will create a targeted mailing or e-mail scenario. After you complete the tasks in this assignment, you will have the following:

- A set of mining models that will suggest the most likely customers from a list of potential customers.
- A clustering of current customers.

To complete the tasks in this assignment, you will use

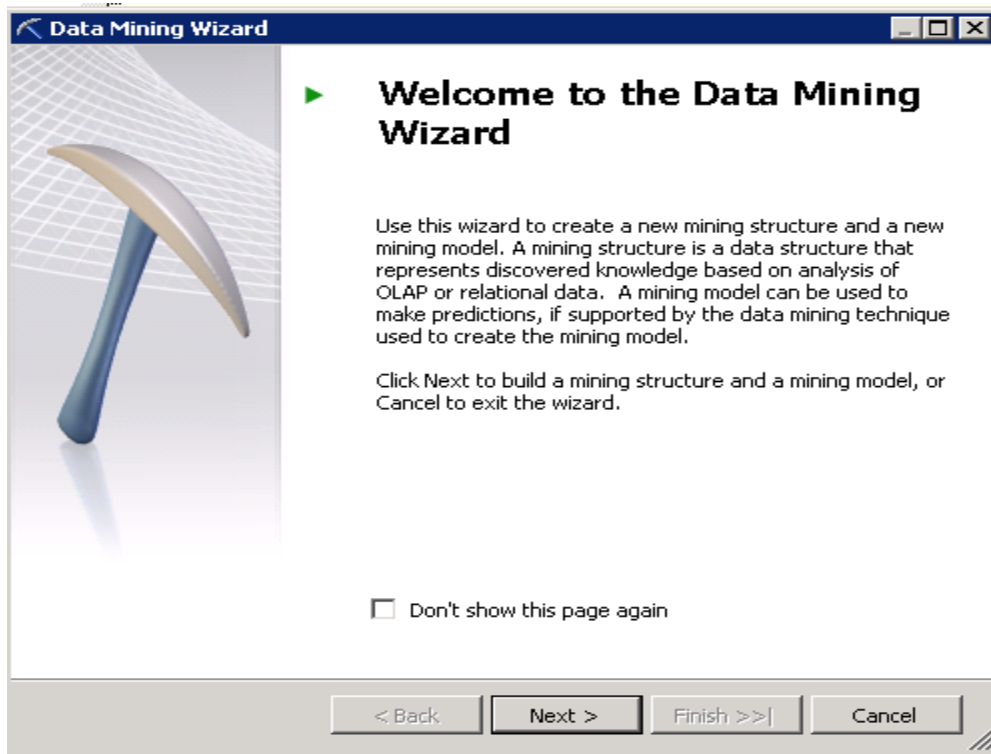
- a) the Microsoft Naive Bayes Algorithm,
- b) the Microsoft Logistic Regression Algorithm,
- c) the Microsoft Decision Trees Algorithm, and
- d) the Microsoft Clustering Algorithm.

## Step-by-Step

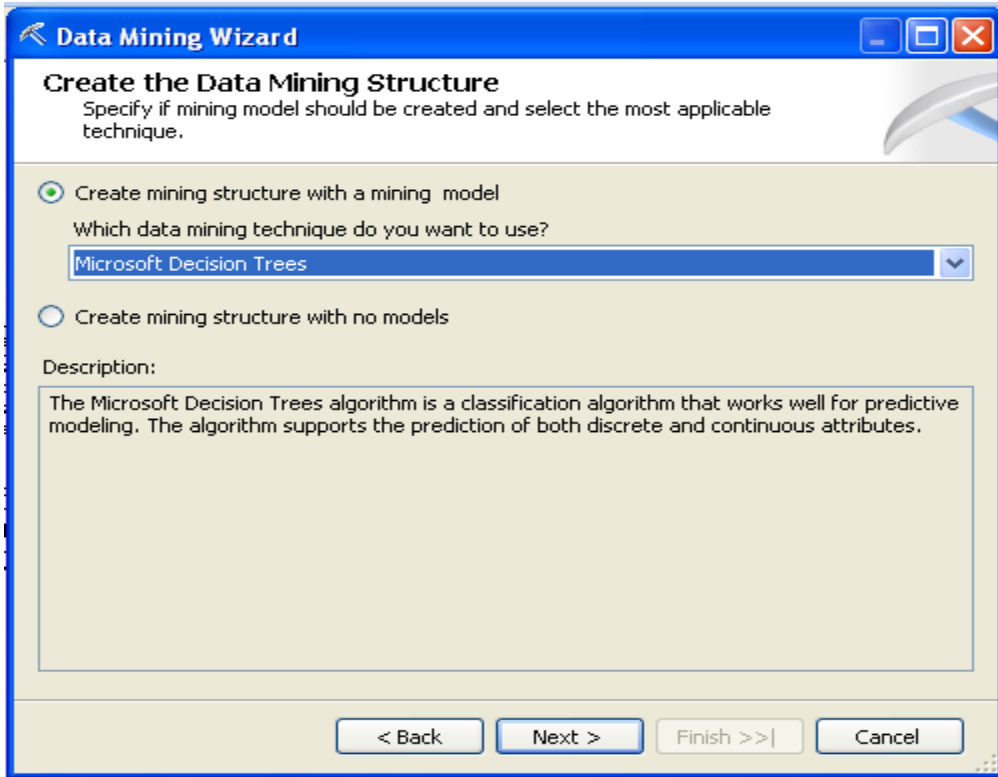
The first step in creating a targeted mailing scenario is to use the Data Mining Wizard in Business Intelligence Development Studio to create a new mining structure and decision tree mining model.

### To create a mining structure for a targeted mailing scenario

1. In Solution Explorer, right-click **Mining Structures** and select **New Mining Structure**. The Data Mining Wizard opens as follows:

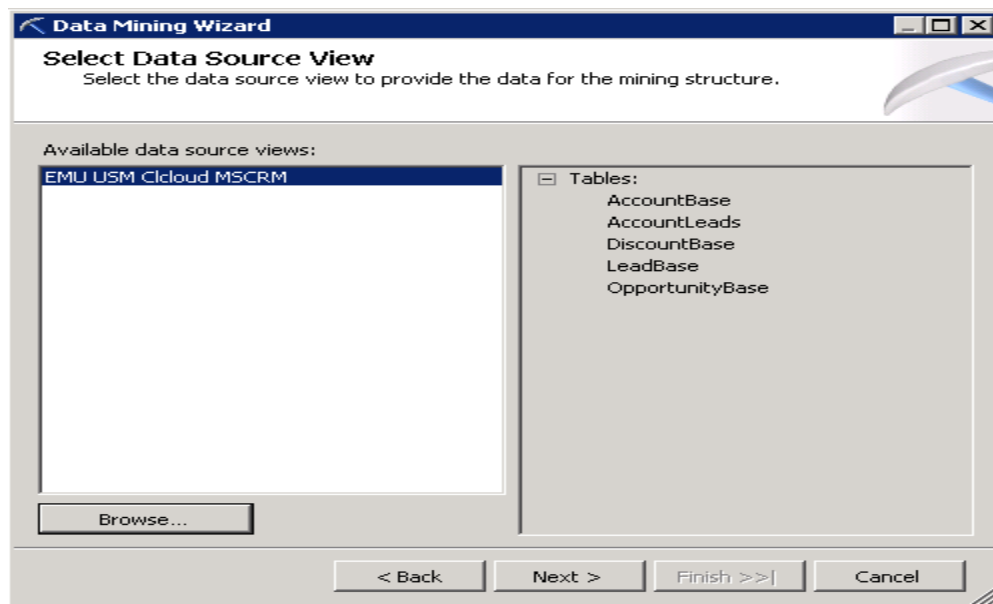


2. On the **Welcome to the Data Mining Wizard** page, click **Next**.
3. On the **Select the Definition Method** page, verify that **From existing relational database or data warehouse** is selected, and then click **Next**.
4. On the **Create the Data Mining Structure** page, under **Which data mining technique do you want to use?**, select **Microsoft Decision Trees**.



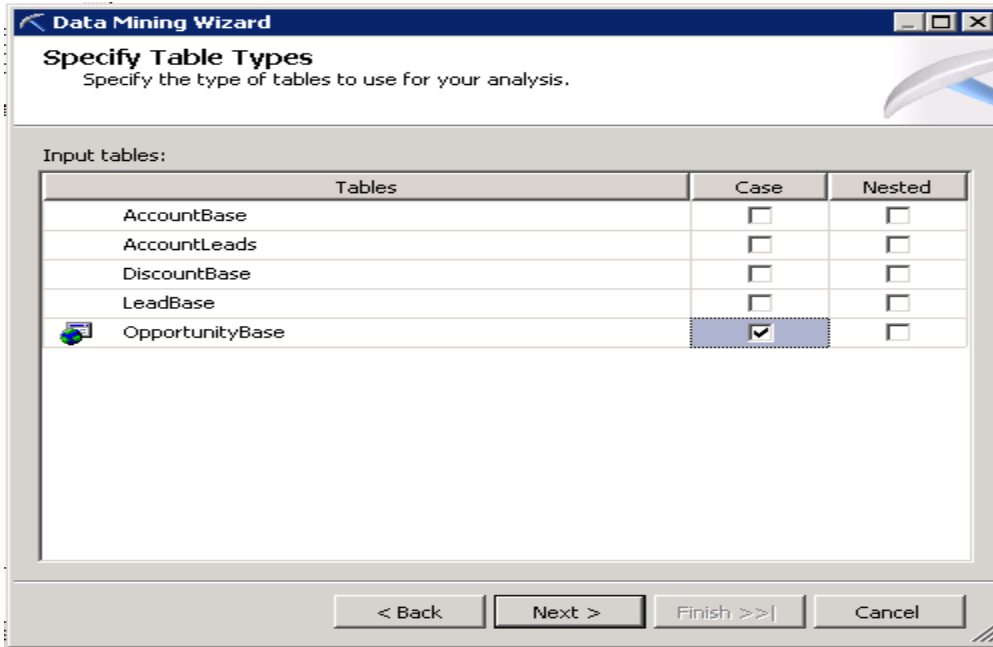
In this tutorial you will create several models based on this initial mining structure. The first model will be created together with the structure when you complete the wizard, and will be based on the Microsoft Decision Trees algorithm.

5. Click **Next**.
6. On the **Select Data Source View** page, notice that EMU\_USM\_Clcloud\_CRM is selected by default. Click **Browse** to view the tables in the data source view, and then click **Close** to return to the wizard.

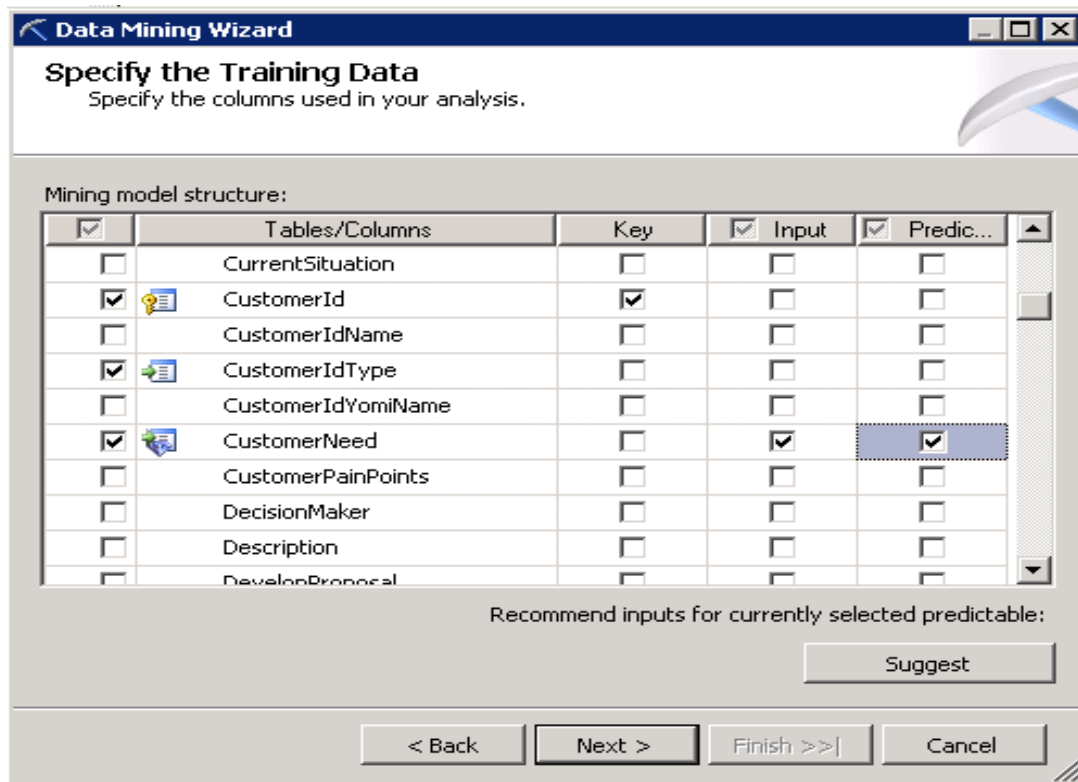


7. Click **Next**.

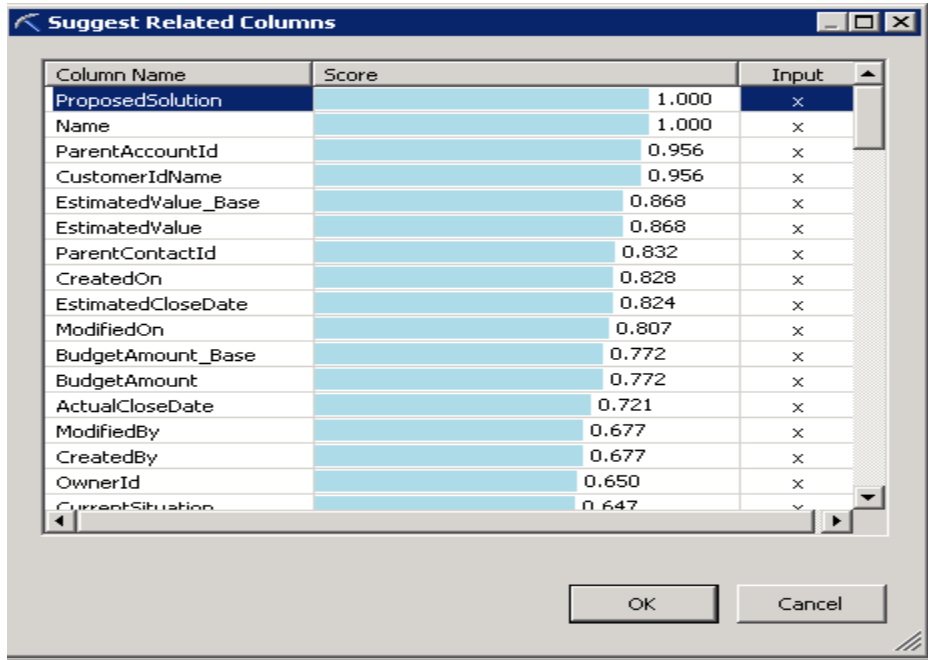
8. On the **Specify Table Types** page, select the check box in the **Case** column next to the Opportunity\_Base table, and then click **Next**.



9. On the **Specify the Training Data** page, verify that the check box in the **Key** column is selected next to the Name column.  
 If the source table from the data source view indicates a key, the Data Mining Wizard automatically chooses that column as a key for the model.
10. Select **Input** and **Predictable** next to the **CustomerNeed** column.

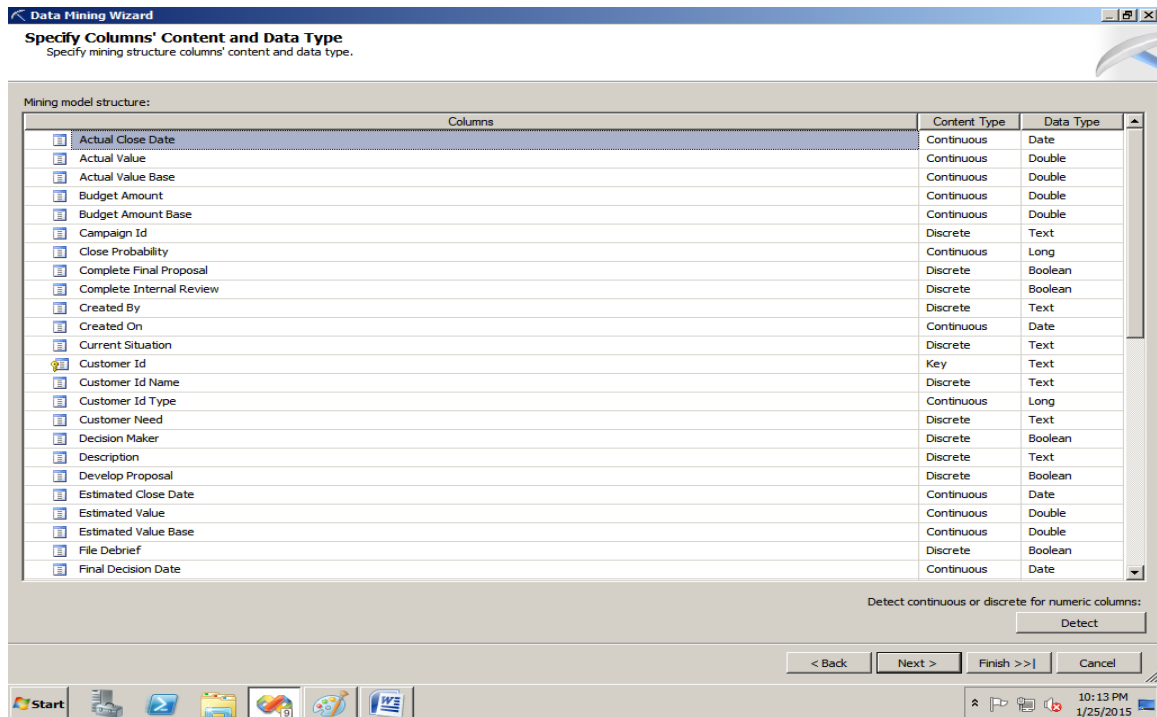


When you indicate that a column is predictable, the **Suggest** button is enabled. Clicking **Suggest** opens the **Suggest Related Columns** dialog box, which lists the columns that are most closely related to the predictable column.



11. On the **Specify Columns' Content and Data Type** page, click **Detect**.

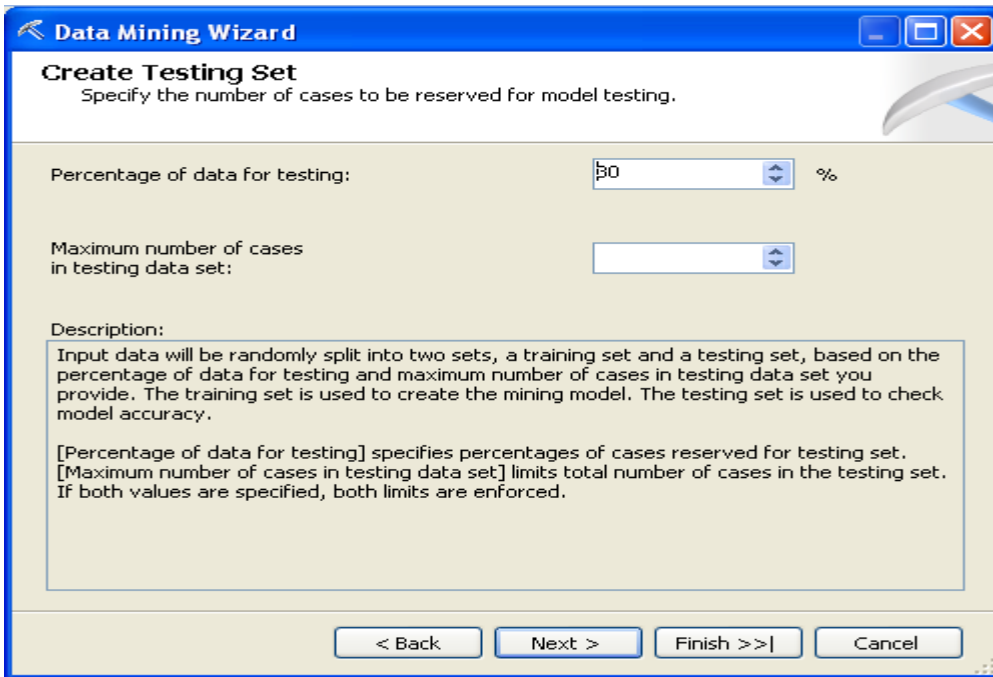
An algorithm runs that samples numeric data and determines whether the numeric columns contain continuous or discrete values. After clicking **Detect**, make sure that the entries in the **Content Type** and **Data Type** columns have the settings listed in the following table.



12. Click **Next**.



13. On Create Testing Set, click Next.



14. On the **Completing the Wizard** page, in **Mining structure name**, type Opportunity\_CRM.

15. In **Mining model name**, type **Opportunity\_CRM\_Decision\_Tree**.

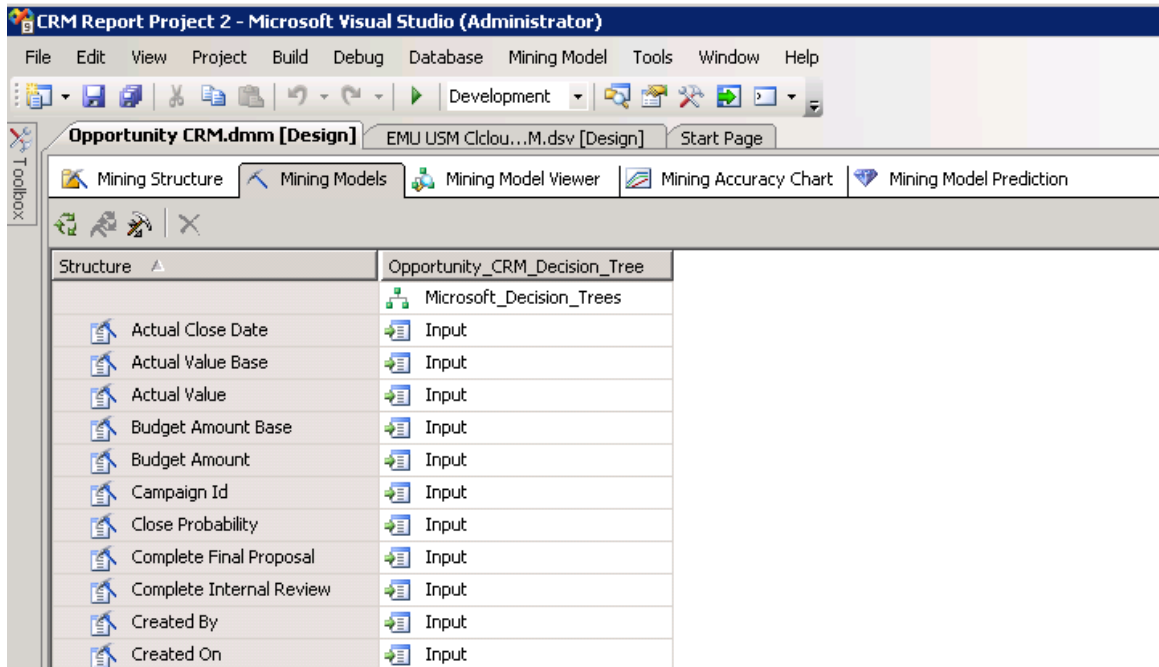
16. Select the **Allow drill through** check box.

17. Click **Finish**.

### 3.2.1.5 Modifying the Targeted Mailing Model

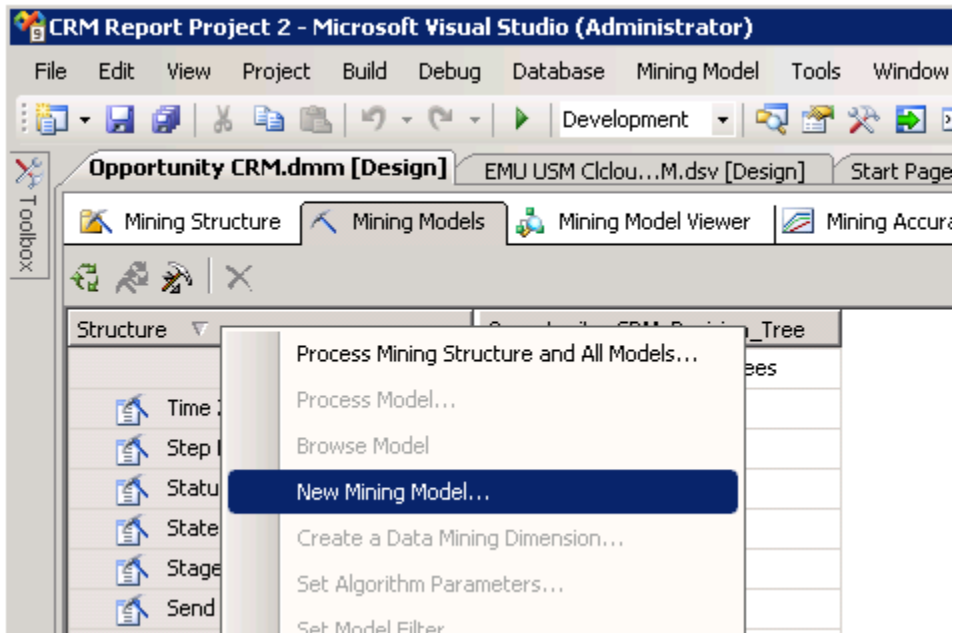
The initial mining structure that you created in the previous task contains a single mining model that is based on the Microsoft Decision Trees algorithm. In this task, you will define three additional models by using the **Mining Models** tab of Data Mining Designer. In this task you will define a Naive Bayes model, a Clustering model, and a logi Regression model.

1. Switch to the **Mining Models** tab as follows in Data Mining Designer in Business Intelligence Development Studio.



Notice that the designer displays two columns, one for the mining structure and one for the initial mining model, which you created in the previous task in this lesson.

2. Right-click the **Structure** column and select **New Mining Model**.



The **New Mining Model** dialog box opens.

3. In **Model name**, type **Opportunity\_CRM\_Clustering**.
4. In **Algorithm name**, select **Microsoft Clustering**.
5. Click **OK**.

A new model appears in the **Mining Models** tab of Data Mining Designer. A model that is built with the Microsoft Clustering algorithm can cluster and predict continuous and discrete attributes. Although you can modify the column

usage and properties for the new model, no changes are required for the Opportunity\_CRM\_Clustering model for this tutorial.

To create a Naive Bayes model

1. In the **Mining Models** tab of Data Mining Designer, right-click the **Structure** column, and select **New Mining Model**.  
The **New Mining Model** dialog box opens.
2. In **Model name**, type Opportunity\_CRM\_NaiveBayes.
3. In **Algorithm name**, select **Microsoft Naive Bayes**. Click **OK**.  
A message appears explaining that the Microsoft Naive Bayes algorithm does not support the Age, Geography Key, and Yearly Income columns, which are continuous. To work with these columns in the Naive Bayes model, you must discretize them. For this tutorial you will just ignore the columns.
4. Click **Yes** to acknowledge the message and continue.

A new model appears in the **Mining Models** tab. Although you can modify the column usage and properties for all the models in this tab, no changes are required for the Opportunity\_CRM\_ model for this tutorial.

To create a logistics Regression model

1. In the **Mining Models** tab of Data Mining Designer, right-click the **Structure** column, and select **New Mining Model**.  
The **New Mining Model** dialog box opens.
2. In **Model name**, type Opportunity\_CRM\_Regression.
3. In **Algorithm name**, select **Microsoft Logistic Regression**. Click **OK**.
4. Click **Yes** to acknowledge the message and continue.

A new model appears in the **Mining Models** tab. Although you can modify the column usage and properties for all the models in this tab, no changes are required for the Opportunity\_CRM\_Regression model for this tutorial.

### Processing the Mining Models

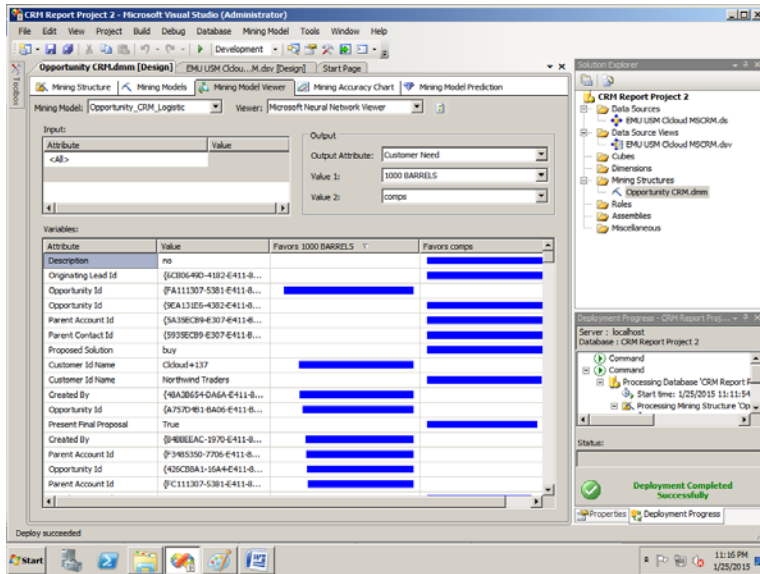
Now that the structure and parameters for the mining models are complete, you can deploy and process the models.  
Processing Data Mining Objects

To deploy the project and process the mining models

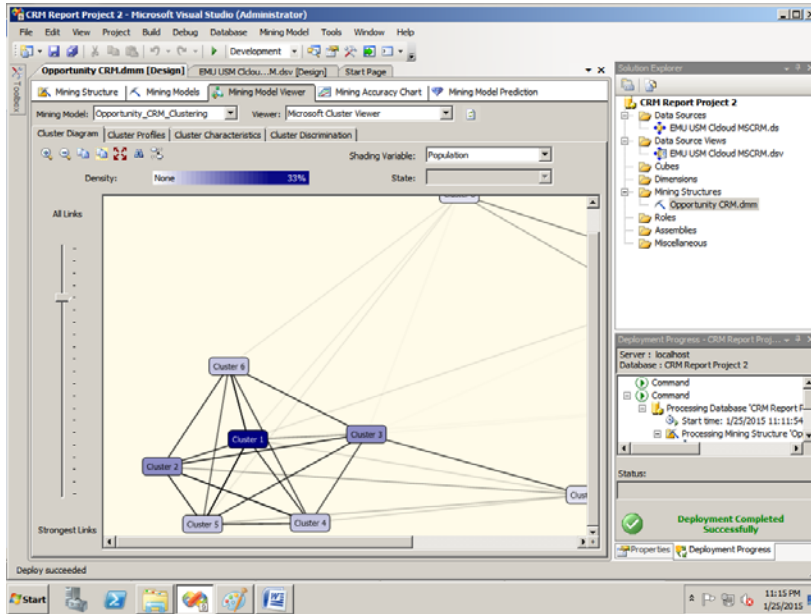
1. **Press F5.**  
The Analysis Services database is deployed to the server computer, and the mining models are processed.

You will see the following diagrams:

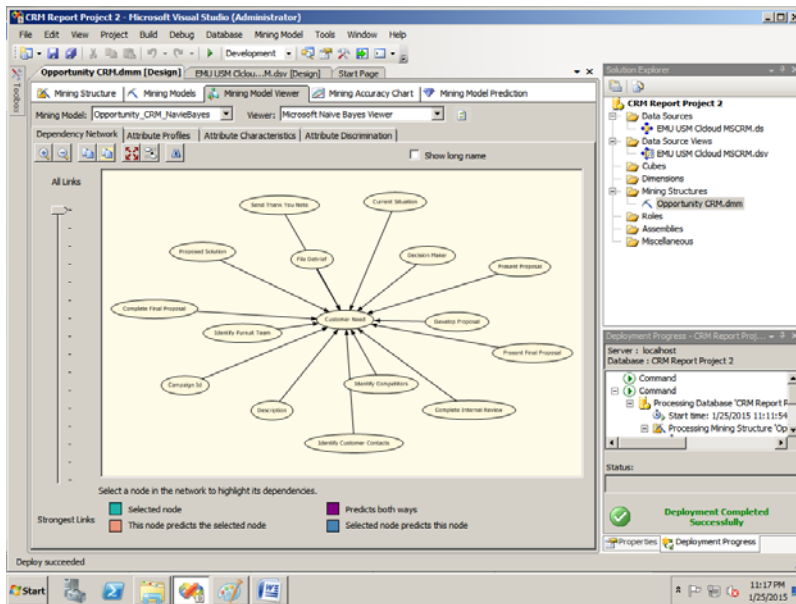
- 1) Go to mining model view and choose Opportunity\_CRN\_Regression as the mining model.



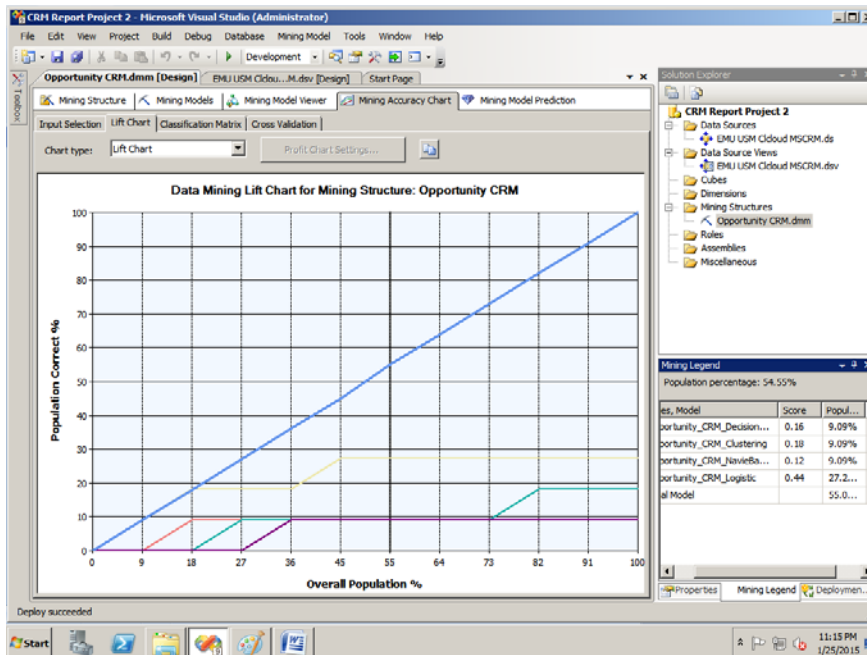
2) Go to mining model view and choose Opportunity\_CRN\_Cluster as the mining model.



3) Go to mining model view and choose Opportunity\_CRN\_NavieBayes as the mining model:



4) Go to Ming Accuracy Chart -> Lift Chart



Do a print screen of each of your algorithm and put them into a drop box later.

### CONCLUSIONS AND FUTURE RESEARCH

While the results are not perfect, it shows how students can use BIDS to analyze the CRM data. Future research will focus on how to improve this curriculum package.

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\*Note: The assignment for the SQL Server Business Intelligence Development Studio is modified from previous SQL Server sample assignment in MSDN library.