

***Database migration and management tool***  
**DBSERVER Documentation**  
June 2010



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### ***Aim of this project***

Development of software tools for storage, management and mining of large-scale population genetics data(demographic and genotype data) including the design of pertinent Graphical User Interfaces and implementation of relevant algorithms.

### ***Introduction***

This application software package “DBSERVER” is developed with the aim to analyze large biological data set. For this purpose sometimes data is required to store in the database. In this package, data(tabular data, means fields are separated by tab) can be imported from text file to the “MySQL” database with minimal user intervention. Even data file/s can be processed without any import operation into the database. This application uses “MySQL” database in the back end for data storage. It is capable to import data from single or multiple data files to a single or multiple database table/s. MySQL database system can store approx 2000 columns per table. For this limitation, if data imported into a table can't be stored in a single table, this application implicitly create one or more table/s to store excess data. Even if input data files contains some common columns, where all data should be imported into a single database table, can be imported easily with our application. Also, if there is a table exist in the database where user wants to import a new set of rows where columns in the input data file and in the table are in different order, then also our system capable to map column values properly at the time of data import operation. Specified sets of analysis on stored data has been made user friendly. Our application also has been designed to serve some additional purposes like fetching only selected fields from one or more data file/s, transposing of tabular data stored in file, changing values in input data file, generating PLINK (A free software for analyzing genome wide association study) formatted data file. This application software allows user to create relationship among stored data tables in the database. On stored data various standard search queries can be applied to create sub data set. Some standard analysis like “genotype count”, “Allele Frequency”, “HWE”, “Cryptic Relationship” can be done on the queried data and can be stored in the database or can be exported to the disk.



# *Chapter 1*



# Getting started

This chapter contains a brief introduction about the application development platform. Also dependencies of our application and how to ensure their availability in your system for running our application.

## 1.1 Brief discussion about development platform

This application software is completely developed under OS Platform Fedora Core 5 and C++ GUI toolkit **Qt Designer's open source edition, Version 3.3.5**. It is **server side database migration and management tool** for serving necessary requirements for mass data storage and analysis. This software tool uses mysql as its pedestrian, another standard database management tool under open source edition. Mysql Version 14.12 Distrib 5.0.18, for redhat-linux-gnu (i386) using readline 5.0 is used.

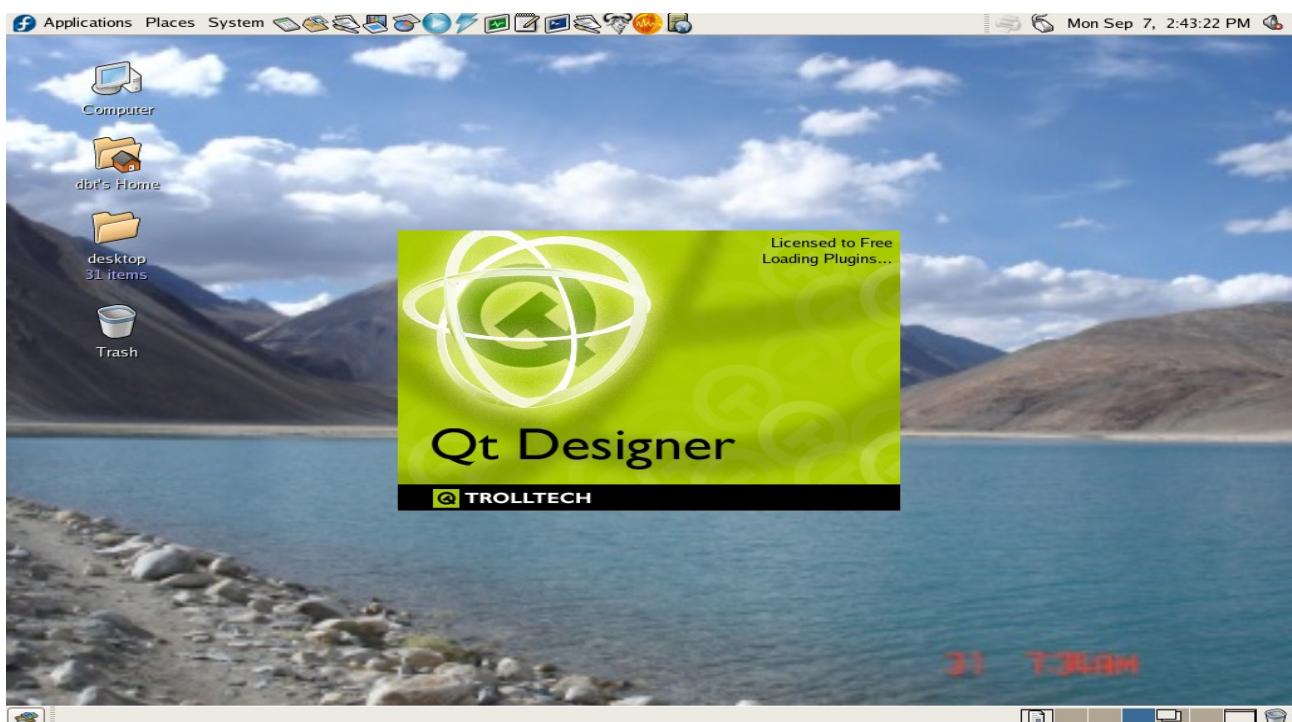
This version of mysql is freely supplied with Fedora Core 5 OS package. **[Important! Your system must have at least 512 MB RAM to run application]**

## 1.2 Dependency checking, downloading and Installation

From the brief discussion above, it is recommended to check whether following packages are installed in your Linux system otherwise install them all.

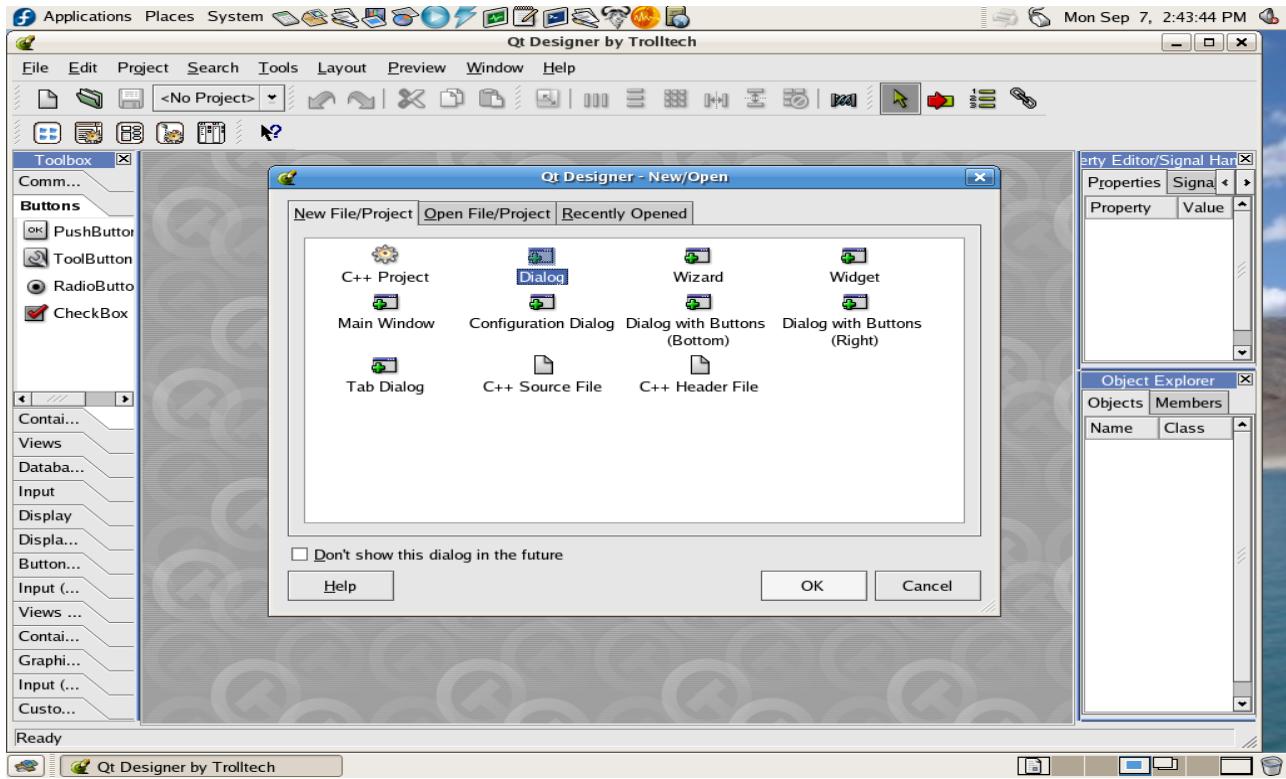
### i) Qt Designer version 3.3.5 or higher version:

**Check:** Applications -> Programming menu list for Qt Designer. Or open a command prompt and type “designer”. If Qt is already installed then Qt Designer's IDE environment will appear as shown in figure **1.2.1, 1.2.2 and 1.2.3** below.



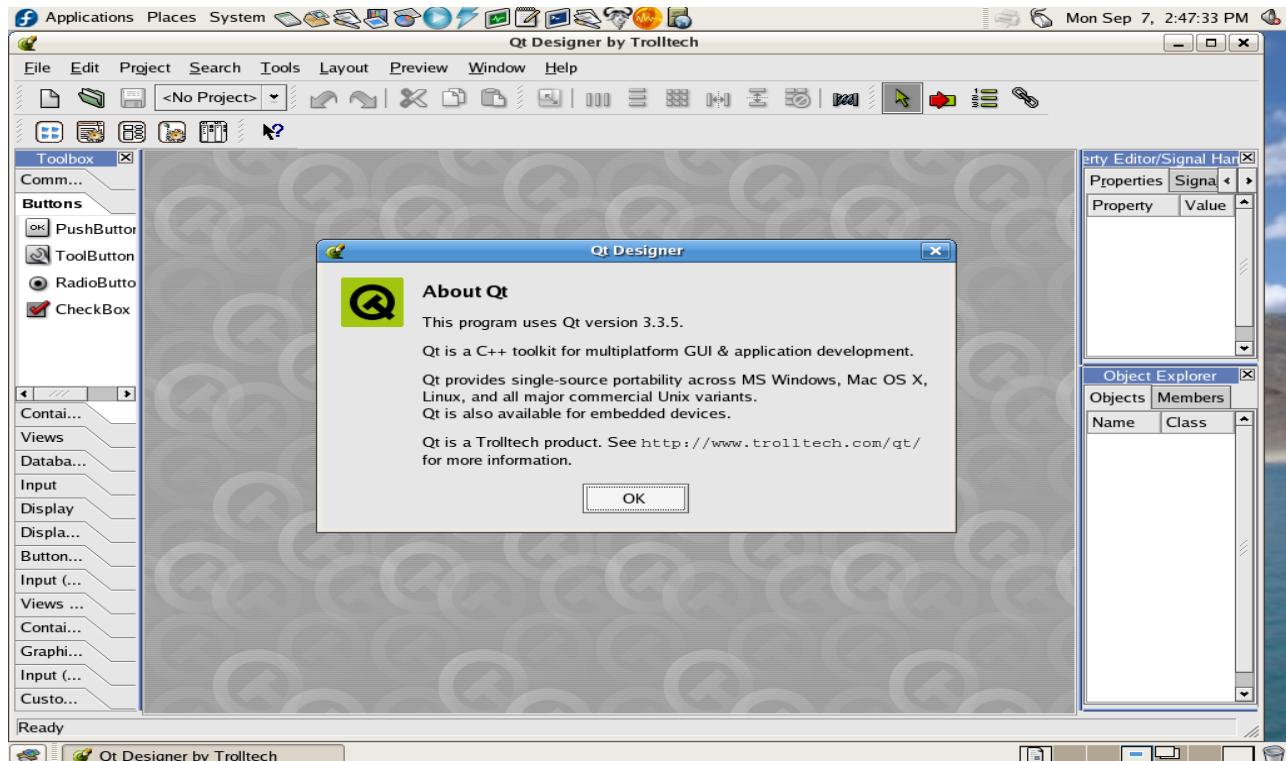
**1.2.1: Qt Designer**

(1)



### **1.2.2: Qt Designer**

From Help -> About Qt you will get information about version of the Qt Designer as shown below



### **1.2.3: Qt Designer**

(2)

**Otherwise install** it from the installation CD of your OS or you can get it from the website <http://www.trolltech.com/qt/>

**ii) Mysql version 5.0.18 or higher version:**

**Check:** Step1: If you are root user skip this step. Otherwise, in a command prompt type “su” (this command is used to log in root mode) and press enter. It will ask for root password. After giving correct password, the shell prompt will change to root mode (it is identified by prompt which appears like '[root@statmath-15 dbt]#').

Step2: In command prompt type “mysql -V”. If it is already installed then you will see information like below.

```
mysql Ver 14.12 Distrib 5.0.18, for redhat-linux-gnu (i386) using readline 5.0
```

Step3: Ensure that “mysqld” service exists under the directory “/etc/rc.d/init.d/” by executing the following command from a command prompt as super user or root user:

```
“find /etc/rc.d/init.d/ -name mysqld -print”
```

or manually browse the directory path “/etc/rc.d/init.d/” and search for “mysqld”.

**Otherwise install** from the installation CD of your OS or you can get it from the website <http://dev.mysql.com/downloads/>

**Other optional package/s:**

These are some optional packages which provide Graphical User Interface(GUI) for mysql database system by which you can also explore your database usage. Install these packages if you have sufficient knowledge about mysql database system and you want to utilize this feature.

Install mysql gui tools by downloading zipped package (generally given in mysql-gui-tools-\*.tar.gz form) from website <http://dev.mysql.com/downloads/gui-tools/5.0.html>. [At the time of downloading from the website you may find some higher version for mysql gui-tools. In that case you may need to install appropriate version of mysql database software package].

Extracting the package you will get four rpm files as listed below (Example for Fedora Core 5)

```
mysql-gui-tools-5.0r12-1fc5.i386.rpm  
mysql-administrator-5.0r12-1fc5.i386.rpm  
mysql-query-browser-5.0r12-1fc5.i386.rpm  
mysql-migration-toolkit-5.0r12-1fc5.i386.rpm
```

At the time of installation you may find that your system ask for installing some dependencies (additional packages) which are essential for using mysql gui tools.

A list of such dependencies are given below,

```
j2re  
glibmm  
gtkmm  
libsigc++
```

Kindly install (as super user) suitable rpm versions of these dependencies(rpm file installation command: rpm -iv <rpm file name>) for your system by downloading from web (Example google search using keyword “download j2re rpm for fc5”).

Now, install mysql gui tools from their respective rpm files from command prompt as super user.

### 1.3 Download our application “DBSERVER”

With all essential dependencies are installed, we are now in a stage to download and work with our own application “DBSERVER”.

DBSERVER is a Linux based GUI application software tool. Below are links to tar.gz files containing binaries compiled on various Linux platforms as well as the Qt Graphical User Interface(GUI) C++ source code.

[**Remember** this release is considered a stable release, although please remember that we cannot guarantee that it, just like most computer programs, does not contain bugs...]

Platform	File	Link	Version
Linux (i686)	dbserver-1.0-i686.tar.gz	<a href="http://www.isical.ac.in/hgu/case/dbserver-1.0-i686.tar.gz">http://www.isical.ac.in/hgu/case/dbserver-1.0-i686.tar.gz</a>	v1.0
Linux (x86_64)	dbserver-1.0-x86_64.tar.gz	<a href="http://www.isical.ac.in/hgu/case/dbserver-1.0-x86_64.tar.gz">http://www.isical.ac.in/hgu/case/dbserver-1.0-x86_64.tar.gz</a>	v1.0
C/C++ source	dbserver-1.0-src.tar.gz	<a href="http://www.isical.ac.in/hgu/case/dbserver-1.0-src.tar.gz">http://www.isical.ac.in/hgu/case/dbserver-1.0-src.tar.gz</a>	v1.0

## *Chapter 2*



# **Installation & running**

This chapter contains details about how to install, compile and run our application.

## **2.1 Installation**

Extract the file “dbserver\*.tar.gz” and place the directory “dbserver\*” anywhere under your home directory.

## **2.2 Source code compilation**

Open a command prompt and login as super user. Using “cd” command proceed to the directory “dbserver\*”. Then execute this command

“chmod +x config.sh” in the command prompt.

After that just compile the source code using the command

“./config.sh” in the command prompt.

## **2.3 Running DBSERVER**

Under the directory “dbserver\*” you will find a exe file named “dbserver”. If you are root user then you can run our application just by double clicking the exe file. Otherwise open a command prompt and login as super user. Using “cd” command proceed to the directory “dbserver\*”. Then type and execute this command

“./dbserver” in the command prompt.



## *Chapter 3*



# Usage details

This chapter contains detail description regarding input/out put data formats and available features in this version of our application. You will also find in this section, how to use our application in details.

## 3.1 Data formats

**Input data format:** Our application accept input data in the form of tab separated text file. If you give any other format it will not accept it.

Input data file must contain data in “Tab Generated Text Format (\*.txt)”. You can write comments at the beginning of the data file where each line must be started with a '#' sign and don't use this '#' sign in any other place in the file. If any field is blank, then it will be filled up with “XX” at the time of checking input data file(you can change this value (“XX”) later. Details are given in next section “Features in details” next page).

**Output data format:** Our application allows user to save table data in the following format,

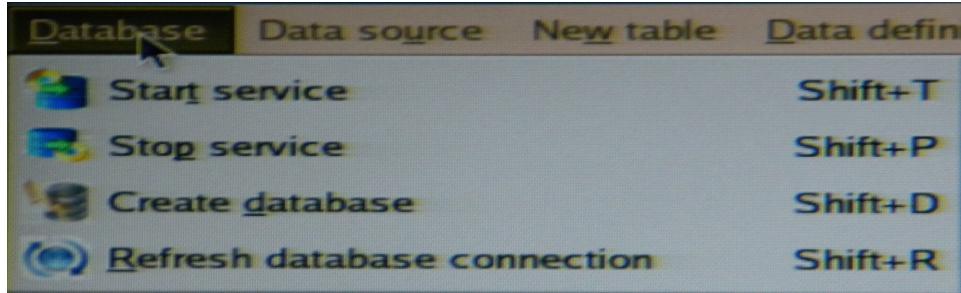
- (i) Comma Separated Version Format (\*.csv)
- (ii) Plink Format (\*.txt)
- (iii) Tab Generated Text Format (\*.txt)
- (iv) Comma Separated Text Format (\*.txt)
- (v) HTML Format (\*.html)
- (vi) XML Format (\*.xml)

### 3.2 Features in details

This section gives detail description of all features provided in this application.

**3.2.1 Menu wise features description:** You can also see these menu items in the tool box below menu bar.

**3.2.1.1 Database:** Tool buttons are available.



**Start & Stop service:** Use “Start Service”, “Stop Service” menu item to start, stop MySQL database service. By default this service runs in the background while you are using this application. This service helps our application to communicate with MySQL database system which is essential.

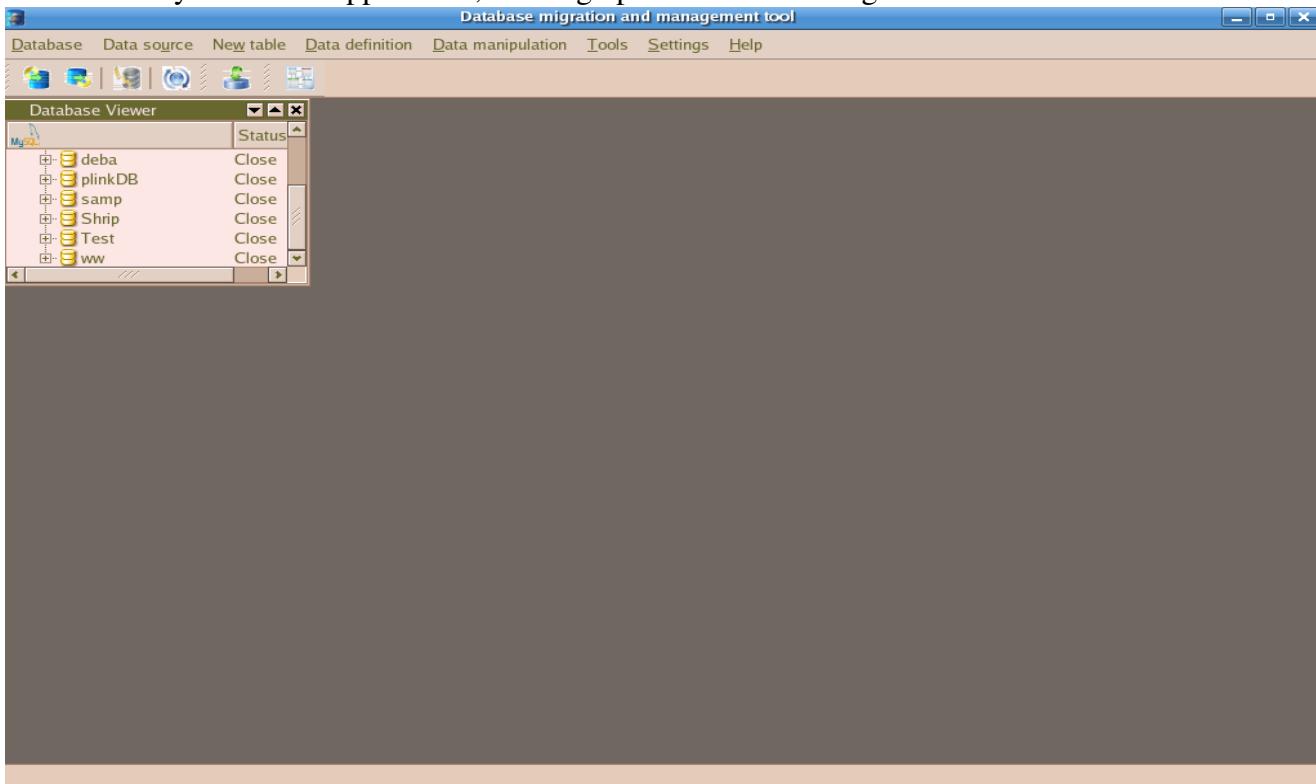
**Create database:** To create new database use this menu item. Created database will be shown in the “Database Viewer” panel. See the “Description of the Database Viewer panel” below.

**Refresh database connection:** Use “Refresh database connection” menu item to reconnect/refresh database connection(refresh content of the “Database Viewer” panel).

**[Important:** To know how to view/delete a database or a table, see the “Description of the Database Viewer panel” next page.]

◆ **Description of the 'Database Viewer' panel:**

When you run our application, a dialog opens as shown in figure 3.2.1.1.1.

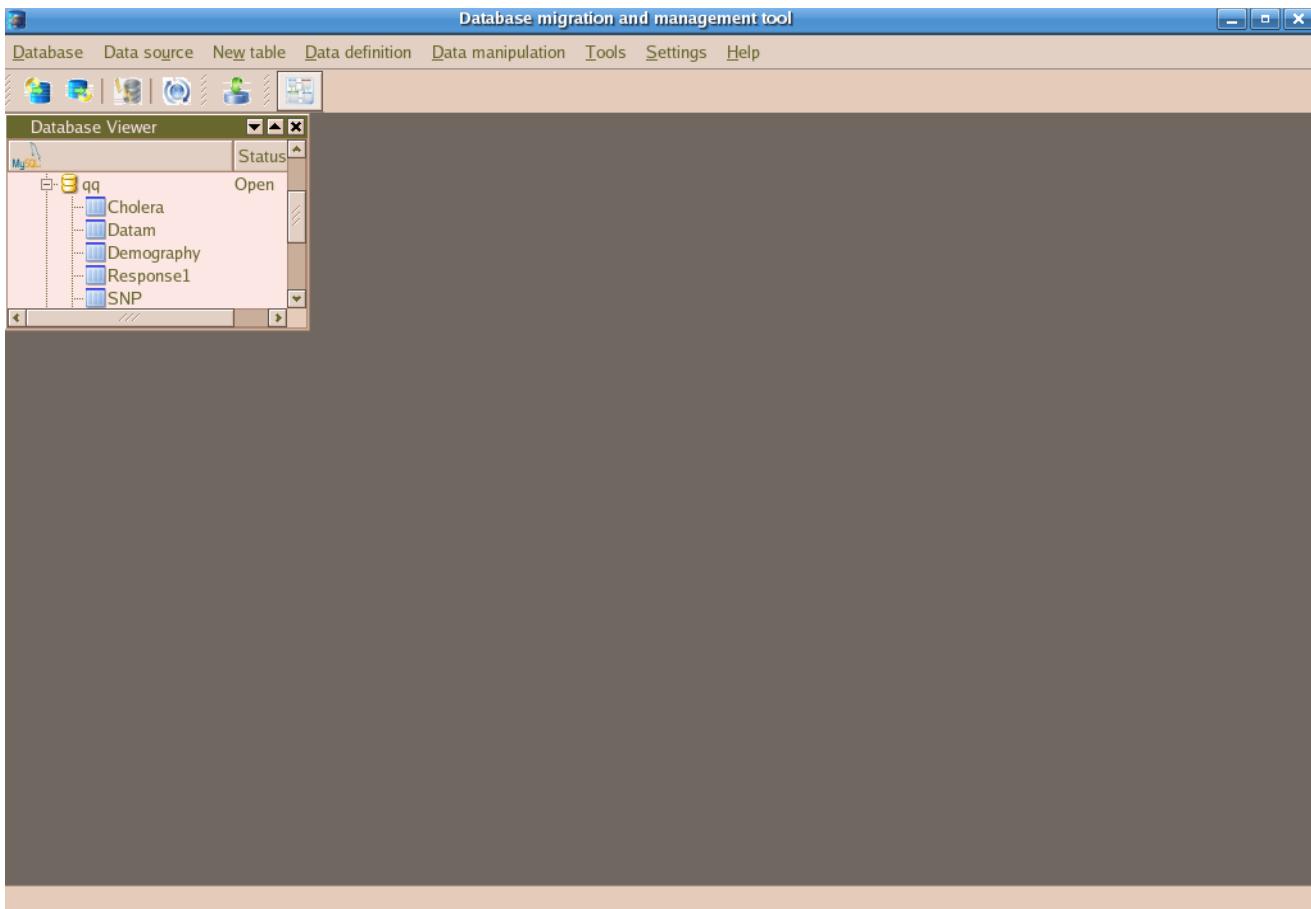


**Figure 3.2.1.1.1: Opening screen of our application(Database Viewer Panel)**

In the top left corner you can see a “Database Viewer” Panel.

Here,

- 1) “ppm” is the name of the database user.
- 2) “Population Database” represents the group name for the group of databases.
- 3) In the figure above “deba”, “plinkDB” represents name of the databases. The status column shows whether a 'database group' or a database is open or close. A minus sign beside the database or 'database group' states that it is in open state. A plus sign beside the database or 'database group' states that it is in close state. If you click on the plus sign the 'database group' or database will be expanded and its contents will be shown in the “Database Viewer” panel. If you click on the minus sign the 'database group' or database will be shrank and its contents will be shown in the “Database Viewer” panel. If you expand the database “qq”, its contents will be as shown in the figure 3.2.1.1.2 next page.



**Figure 3.2.1.1.2: Database Viewer Panel showing contents of the database “qq”**

Here in this figure you can see the database “qq” is now in open state and it's contents which are database tables are shown namely, “Cholera”, “Datam”, “Demography”, “Response1”, “SNP” and “Typhoid”.

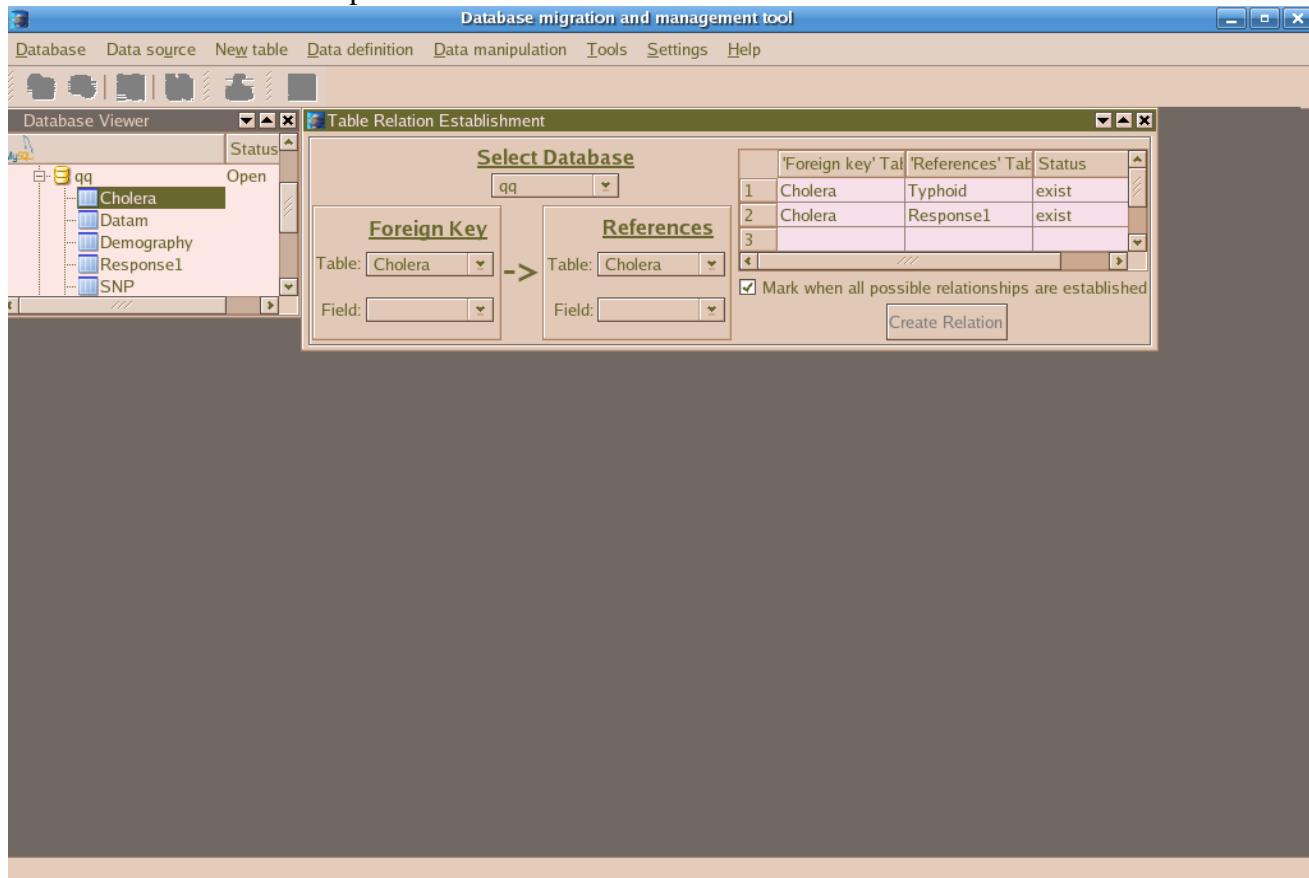
**How to view the contents of a table?** Just press the left mouse button once on the table name or on the icon beside the table. The table's contents will be shown. Here, right click on any cell value, a drop down list will appear with three options, “Insert”, “Update” and “Delete”. You can't discard any changes made by “Delete” the operation. In case of “Insert”, “Update” operations you can do this manually as described below.

**Insert:** If you select insert option, a new row will be created where you can insert new values in each cell. After typing value in a cell to go to the next cell use tab. Do not use mouse button. If you have made a wrong insert operation just delete the row to discard the insert operation.

**Update:** If you select update option, you can update values of the selected row. After editing value in a cell to go to the next cell use tab. Do not use mouse button. If you have made a wrong update operation just again do the same operation to undo changes manually.

**Delete:** If you select update option, you can delete the selected row. Delete operation is completely undo able.

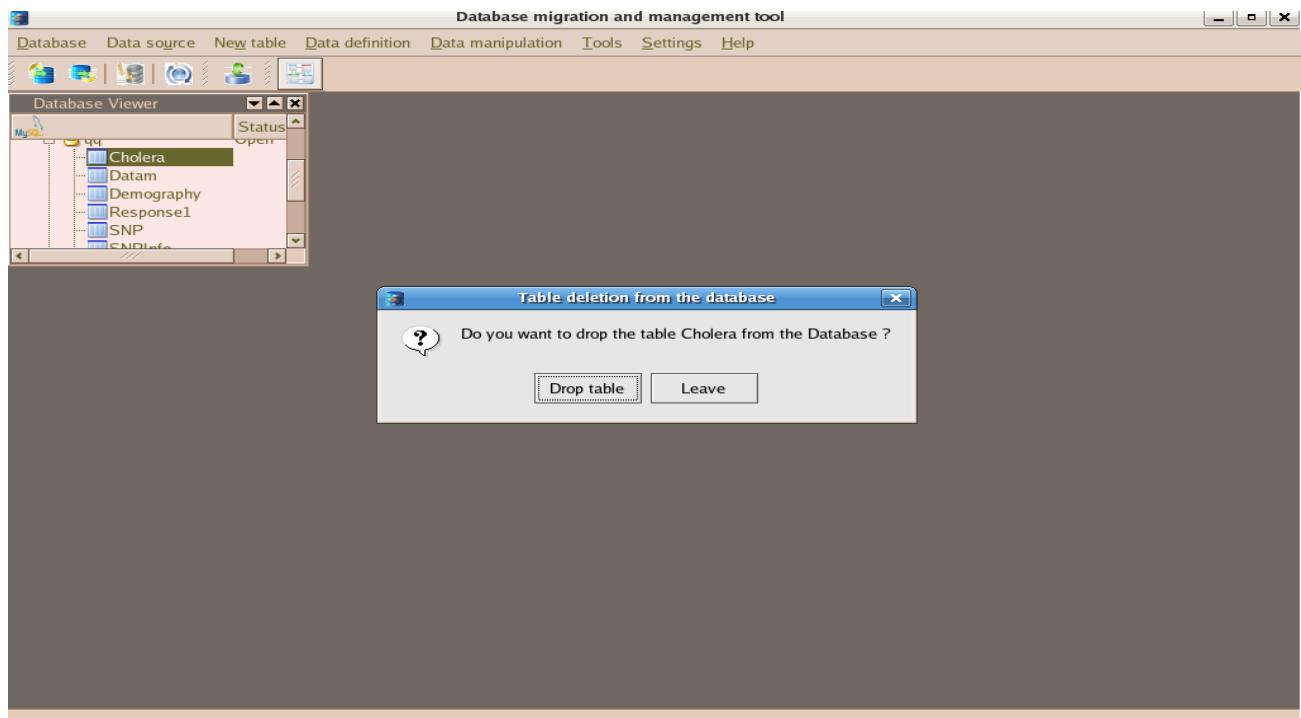
**How to delete a table?** Press the right mouse button once on the table name or on the icon beside the table. A dialog will appear depending on whether the table has any relation with any other table on the database or not. See the figures 3.2.1.1.3, 3.2.1.1.4 and 3.2.1.1.5 below to understand deletion procedure.



**Figure 3.2.1.1.3: Showing existing relations among tables in the database “qq”**

Before deleting a table from a database you can take a look at the “Table Relation Establishment” dialog as shown in the above figure. Here, you can see that in the database “qq”, the table “Typhoid” and “Response1” have primary-foreign key relationship with the table “Cholera”.

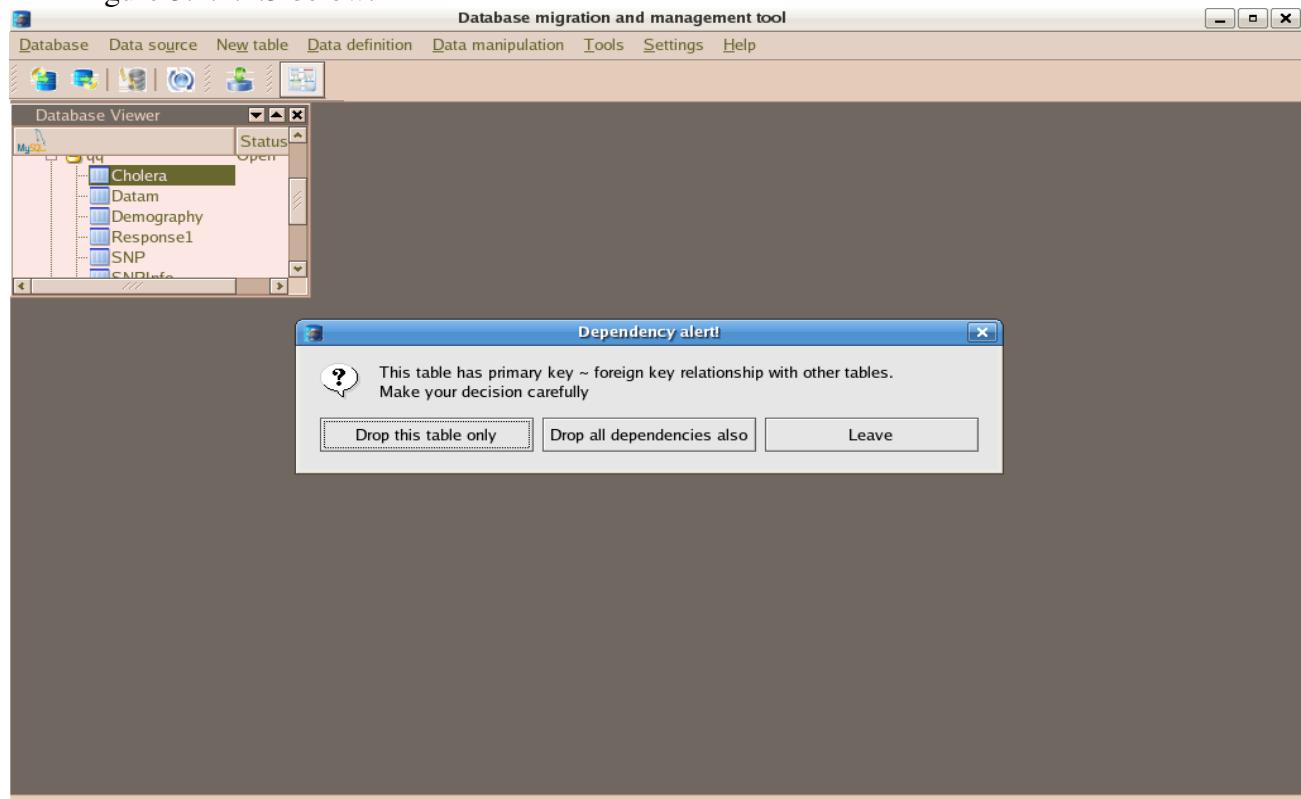
Now, if you want to delete any of these tables, a decision making dialog will appear as shown in the figure 3.2.1.1.4 below(next page).



**Figure 3.2.1.1.4: Table deletion message dialog(First dialog)**

If you want to discard table deletion operation, press “Leave” button.

If you press “Drop table” button, another decision making dialog will appear as shown in the figure 3.2.1.1.5 below.



**Figure 3.2.1.1.5: Table deletion message dialog(Second dialog)**

Here,

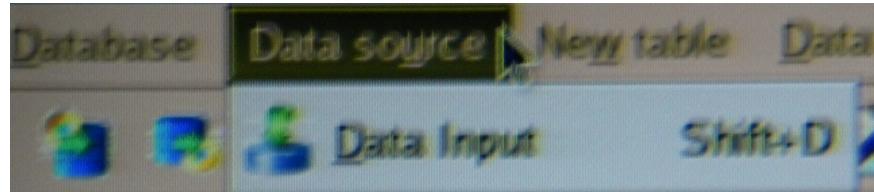
- i) If you click on the button “Drop this table only”, all existing relations of the table “Cholera” with other tables will be braked and only the table will be deleted.
- ii) If you click on the button “Drop all dependencies also”, all existing relations of the table “Cholera” with other tables will be braked and not only the table “Cholera”, but also the tables related with this table, “Typhoid” and “Response1” (in our example) will be deleted.
- iii) If you click on the button “Leave”, deletion operation will be postponed.

After successful deletion you can tick the “Table Relation Establishment” dialog again.

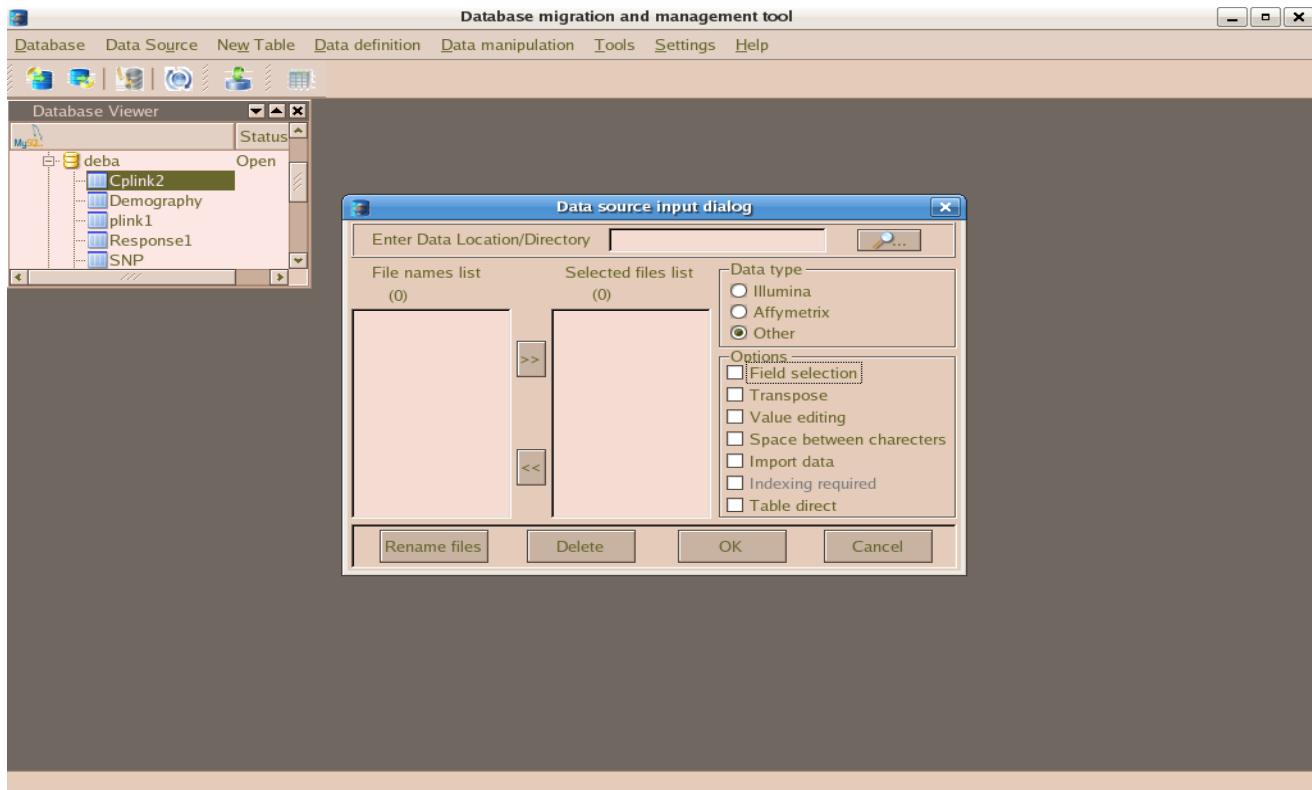
On the other hand, if the table to delete isn't in relation with any other table in the database, the second decision making dialog will not appear.

If you found any unknown table in your database where table name contains “\_view” tag in its rear end side, that is actually a view not table. You don't need to worry about it. just delete the view by pressing the right mouse button once on the view name.

### 3.2.1.2 Data Source: Data source -> Data input.



- **Data Input:** On selecting this menu item “Data source input dialog” will be as shown below in Figure 3.2.1.2.1.



**Figure 3.2.1.2.1: Data source input dialog**

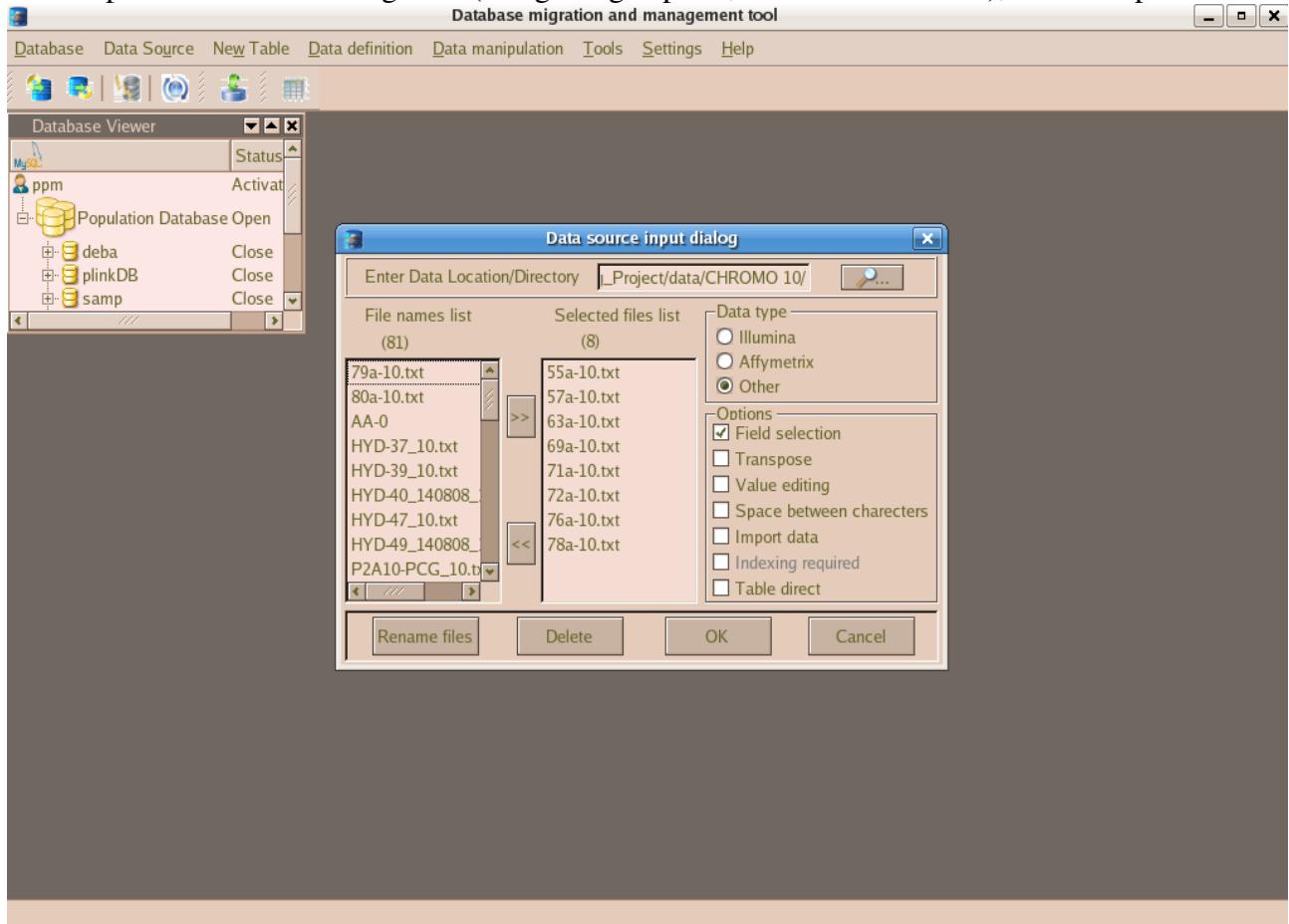
Here, on selecting a directory locations by browsing, file names under that directory are listed in the left panel. You can use “>>” button to select one or more files and “<<” button to de-select one or more files. On selected files you can perform following operations.

- ◆ **Data type:**
    - i) **Illumina:** To process 'illumina' data in a single button click user is required to select this option under 'Data type' caption. 'Options' panel is disabled in this case.
    - ii) **Affymetrix:** To process 'affymetrix' data in a single button click user is required to select this option under 'Data type' caption. 'Options' panel is disabled in this case.
- When using any one of these two data types, no option can be selected from the 'Options' panel.

**iii) Other:** When 'other' is selected under 'Data type' caption, different options under 'Option' caption can be selected according to requirement.

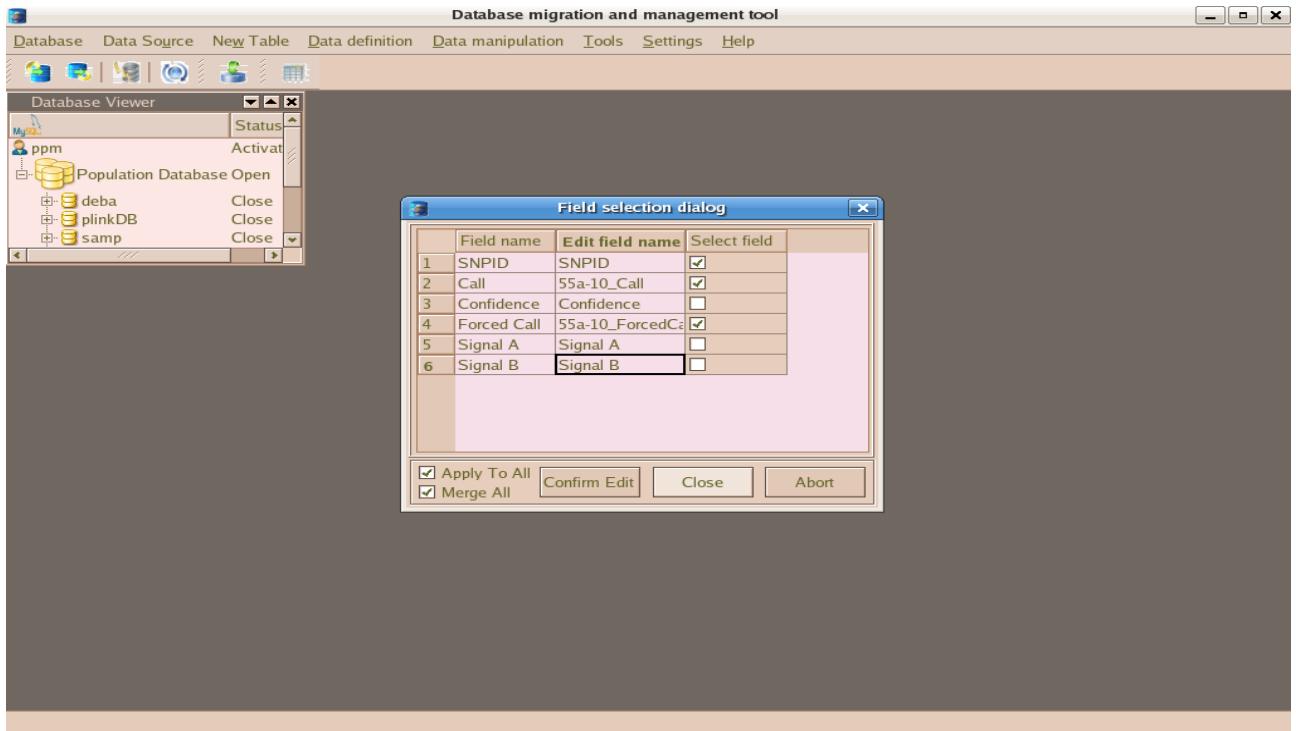
Requirements of different options are enlisted below.

**a) Field selection:** If you want to fetch selected fields from one or more file/s and save them in separate files or in a single file(using merge option, will be shown later), use this option.



**Figure 3.2.1.2.2: Data Source Input Dialog, 'Field selection' services**

If “OK” button is clicked, system ask for a table name. After you give the table name and click the “OK” button a “Field selection dialog” will appear.



**Figure 3.2.1.2.3: Field selection Dialog**

Here, field names from input data file is listed in table format. From “Select field” column, select fields. You must change selected field's name into a single word (word length should be as small as possible) under “Edit field name” column. [Remember! After you edit a field name, you must click once outside that cell]. Then you must press “Confirm Edit” button to confirm edit operation.

If you want to apply same field selection option(what you have just chosen for the present file) for all input data files,(ensure that in all the input files there exist same number and types of fields in the same order) then select the “Apply To All” tick box.

If you want to merge the selected fields into a single file/table, then tick the “Merge All” tick box.

Then, press the “Close” button to start the operation.

Press the “Abort” button to abort the operation.

In the similar way...,

**b) Transpose:** Use this option to transpose a input data file containing data in tabular format.

**c) Value editing:** To edit data(say “NoCall” with “0 0”) in the input file use this option.

**d) Space between characters:** Use this option to insert space between a pair of characters.

[In each of the above cases output data file/s will be saved in the same location from where input data file/s has been taken.]

**e) Import Data:** Use this option to import data from input file/s into the database table/s. This is explained in details below in section “**Details about data importing**”.

**f) Indexing Required:** If this option is used, a column will be created as the first column/field in the file with auto generated numbers against each rows/records starting from '1'. If you want to preserve the order of the data/records as it is in the input data file you must tick this option while importing data file/s into the database).

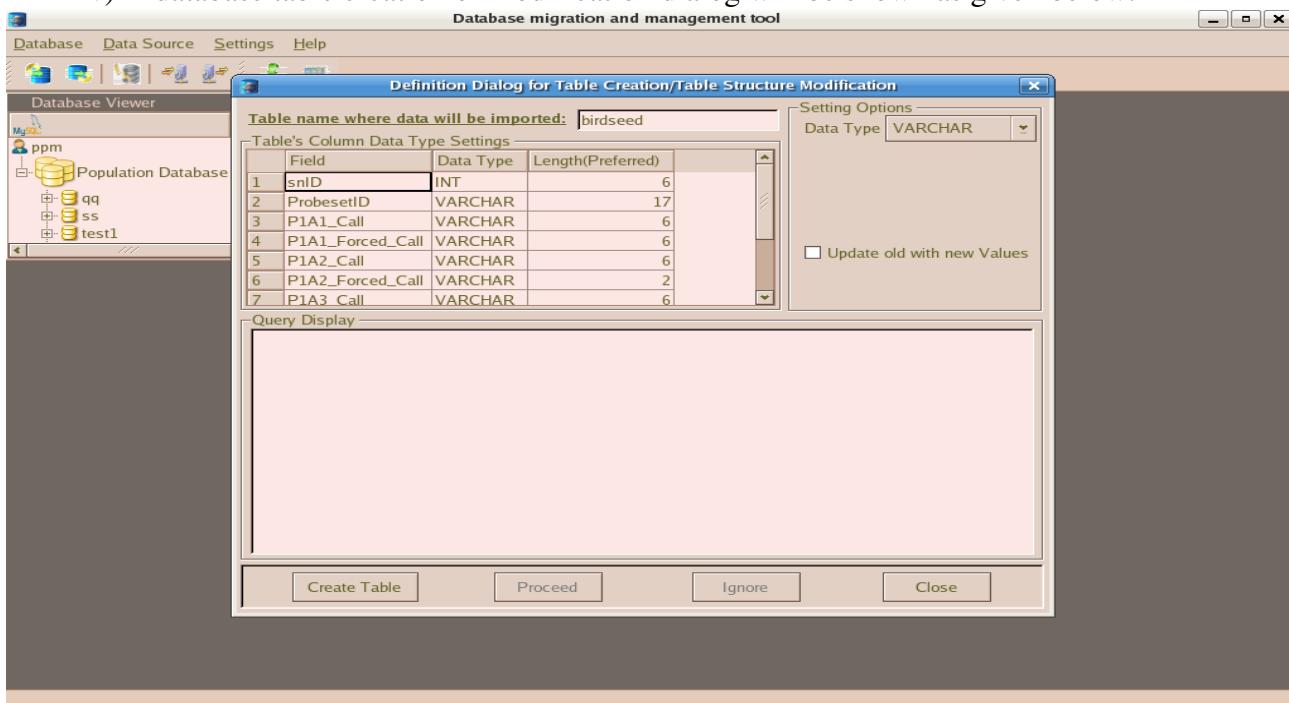
**g) Table direct:** This option must be used with some careful steps. It is explained in details below in section “**Details about table direct**”.

After selecting your required operation/s click the 'OK' button.

## ■ Details about data importing:

Steps to import data from input data file:

- i) Select data file/s from input dialog to import into the database.
- ii) Depending on options selected from the 'Data input' dialog necessary operations are performed. [user intervention may or may not required]
- iii) Performs a file checkup operation & file splitting if required. [No user intervention required]
- iv) A database table creation or modification dialog will be shown as given below.



**Figure 3.2.1.2.A.1: Table creation/modification dialog**

In this dialog following features are given:

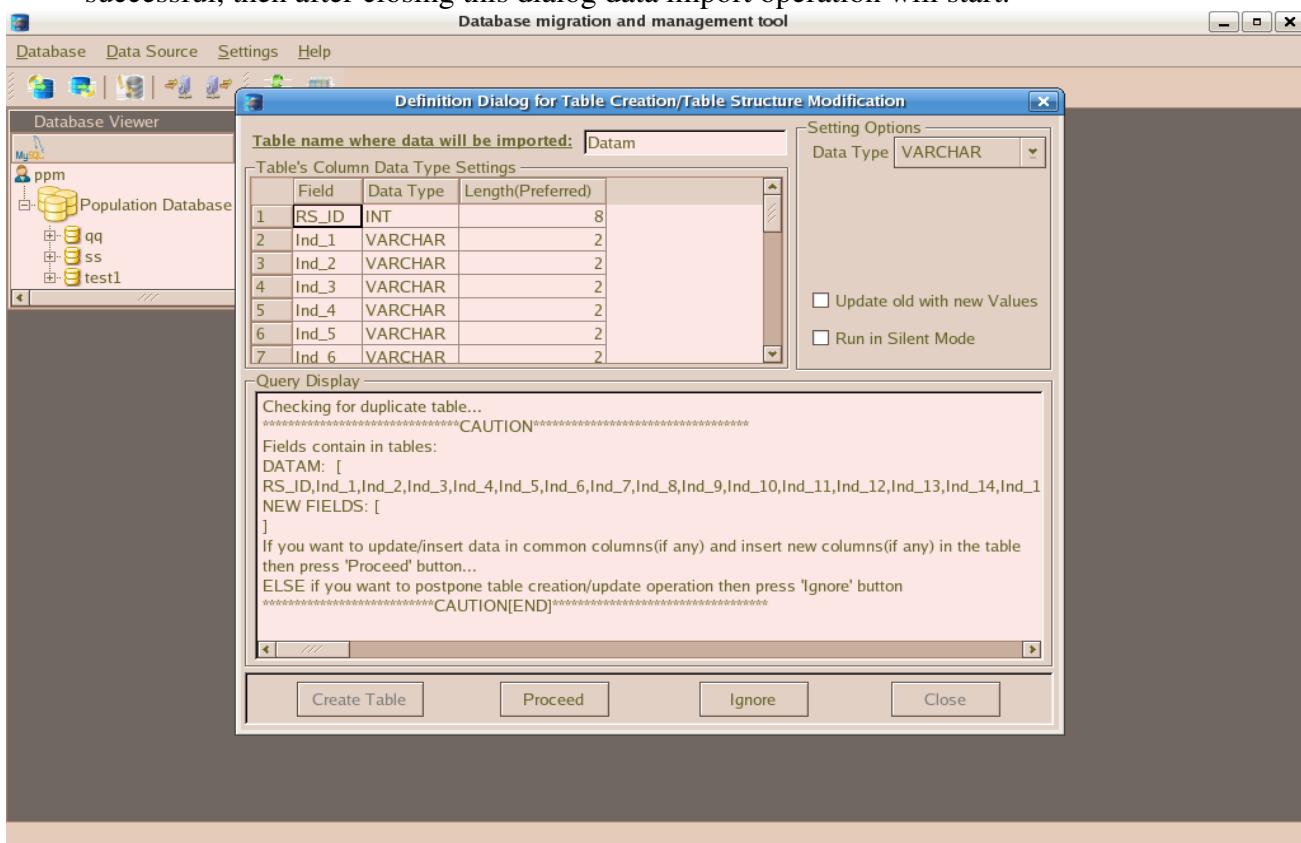
- i) **Changing data type:** Do this only if you have knowledge about database systems. Select the cell containing the data type you want to change in the table. Then select a different data type from "Data Type" drop down list box. Changed Data Type value's corresponding preferred length value has to be specified separately.
- ii) **Update option:** Suppose you are importing a data file into an existing table in the database and your input data file contains one or more field/s which are already exist in the table with values. Now, if you want to change an existing field's value with a different value, tick the 'Update old with new Values' tick box.
- iii) **Silent mode:** This option will be shown when you are going to import more than one file in the same table. If you tick this box, this dialog will not come again before importing next data file.

**iv) Create Table:** Click this button to create a table or modify an existing table in case the table already exist in the database. In the “Query Display” viewer you can see the status of this operation.

**v) Proceed:** If user is going to create a table that already exist in the database, then this button will be activated. Click this button and follow the instructions given.

**vi) Ignore:** Use this button to postpone table creation/update operation as per application's run time instructions as shown in the figure 3.2.1.2.A.2 below.

**vii) Close:** Use this button to close the dialog. If table creation/modification operation is successful, then after closing this dialog data import operation will start.



**Figure 3.2.1.2.A.2: Table creation/modification dialog with active “Proceed” and “Ignore” button**

### [Important!

**(A)** If imported data need to store in multiple tables, our application do this operation automatically with little user interaction. In that case table names are automatically generated as, first table's name, then a positive number started from “1” followed by an underscore, like “Datam”, “Datam\_1”, “Datam\_2” ...etc.

**(B)** If there is a table exist in the database where user wants to import a new set of rows where columns in the input data file and in the table are in different order, then also our system capable to map column values properly at the time of data import operation.]

- **Details about table direct:** From 'Data source input dialog', only one data file can be taken as input with 'table direct' option is selected. To insert data from that file into a table see section 3.2.1.3 New table below. You can perform operations enlisted under 'Data manipulation' menu bar after taking a data file as input with 'table direct' option is selected. Though, for 'delete' operation you do not need to take any data file as input.

### **3.2.1.3 New table:** New table -> New.

User can use this feature to create an empty table providing necessary structural informations. Follow the 'New table' menu bar option to create a new table as shown in the figure 3.2.1.3.1 below.

**[Remember!]** Columns/fields in the newly created table must be same as fields in the tab generated input data file. If first field is integer, then in the table first column will be of type 'INT' with proper column length so that it can hold all data in correct form as in the data file. Similarly, if second field is of type floating point or string(or character), second column in the table will be of type FLOAT or VARCHAR respectively.]

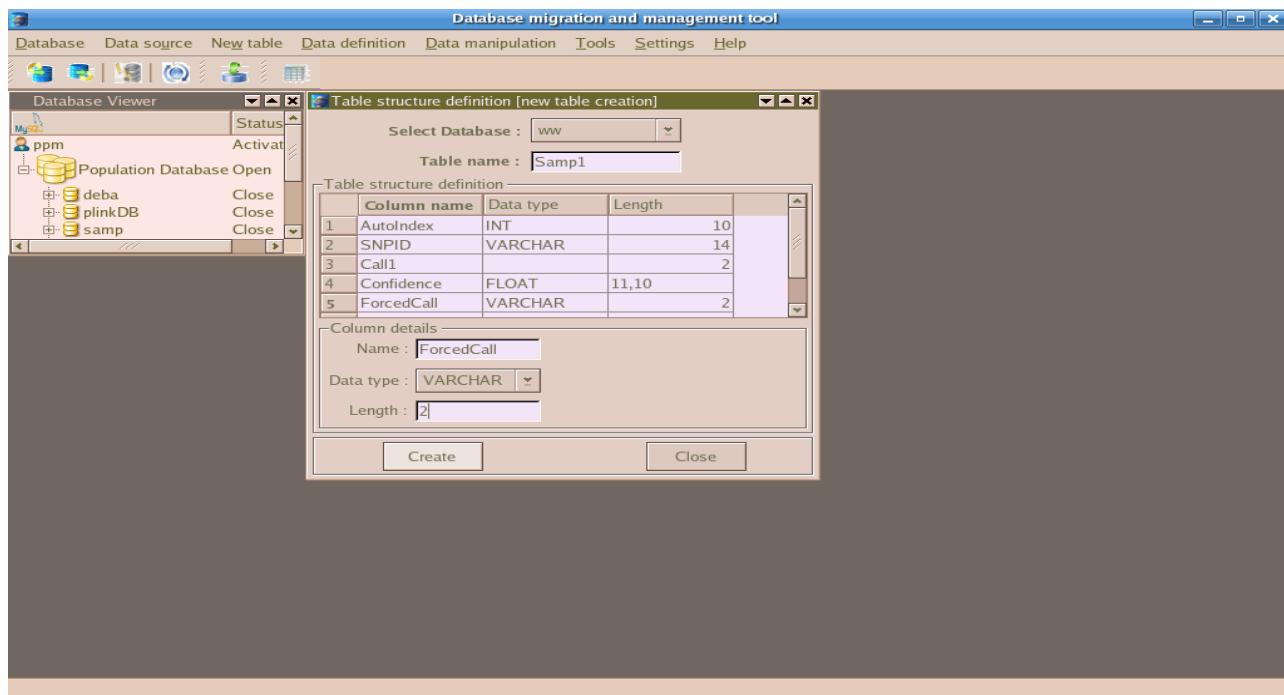
#### **Steps to create an empty table are as given below:**

**Step 1:** Select a database where you want to create the table.

**Step 2:** Give a table name in a single word.

**Step 3:** First row in the table under label 'Table structure definition' is filled up by default.

So, select the cell under the column 'Column name' in the next empty row. Then, click in the text box against the label 'Name : ' under the caption 'Column details'. There type column name in a single word. Next, give data type and length values. These values will be displayed in the selected row in the table. Where values can also be edited.



**Figure 3.2.1.3.1: Table structure definition[new table creation]**

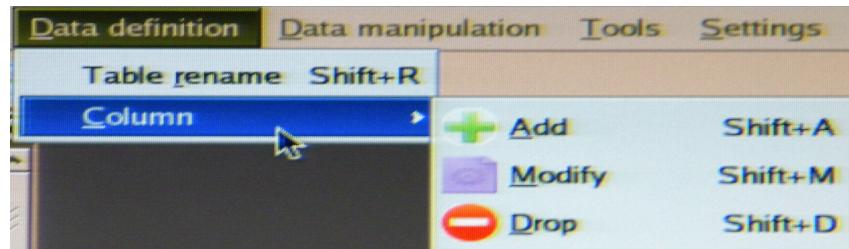
**Step 4:** If you need second (mean while a third) or more column then repeat Step 3.

**[Remember!]** length value of a column must be specified correctly so that the column can hold maximum length value stored in it.]

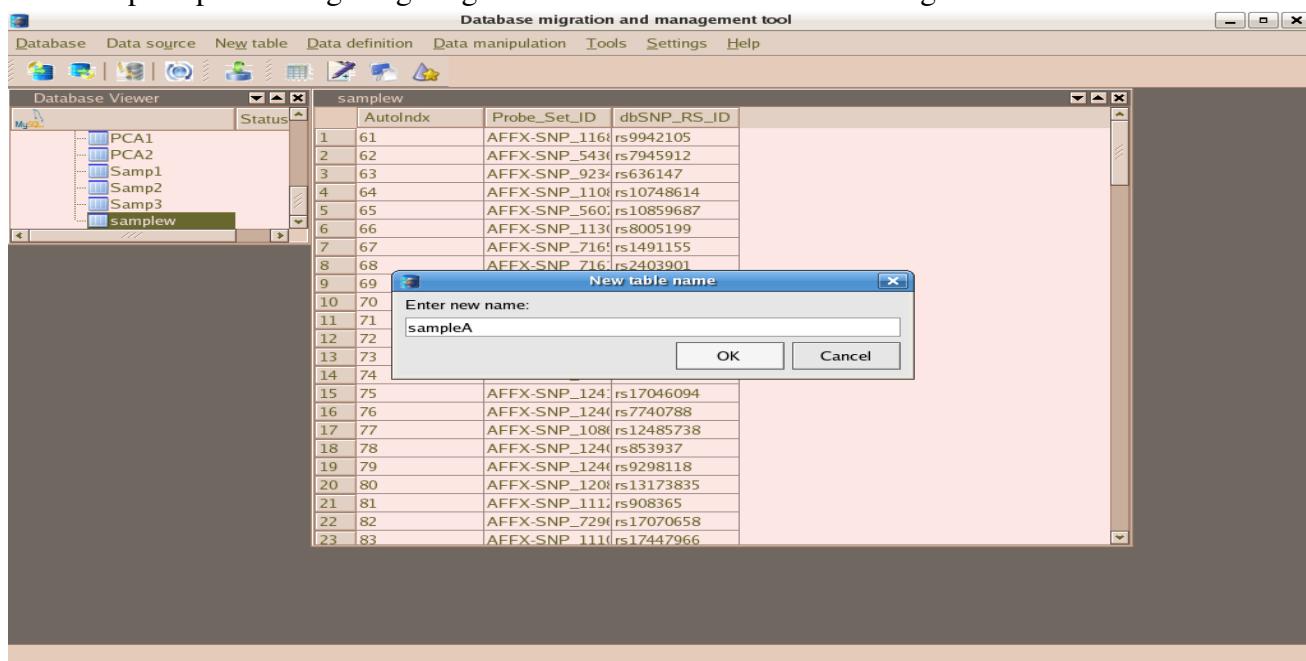
**Step 5:** Click on the 'Create' button to create the table. If there are any mistake happen in the given table name or in it's structure definition corresponding messages will be displayed as guidance for error correction. If the table is created successfully under the given database, corresponding messages will be displayed.

**Step 6:** Close the dialog by clicking the 'Close' button.

**3.2.1.4: Data definition:** From 'Data definition' menu bar there are options for table renaming and column addition, modification, dropping. First open a table.



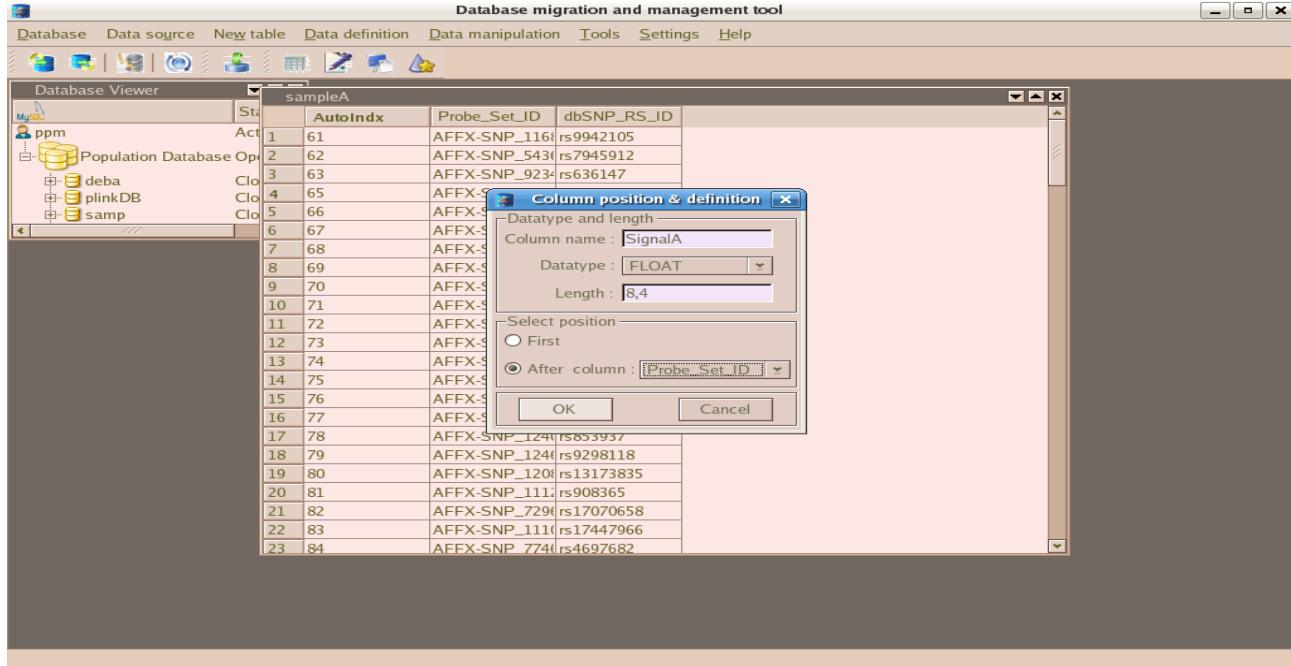
**a) Table renaming:** Select 'Table rename' option from 'Data definition' menu bar. A dialog will be prompted asking for giving new table name as shown in the figure 3.2.1.4.1 below.



**Figure 3.2.1.4.1: Renaming table 'samplew'**

New table name is given as 'SampleA'. If 'OK' button is clicked, table will be renamed.

**b) Column addition:** Select 'Column -> add' option from 'Data definition' menu bar. A dialog,



**Figure 3.2.1.4.2: Adding column in the table 'sampleA'**

as shown in the figure 3.2.1.4.2 above will be prompted, asking to provide information for adding new column at the user specified position in the table. In the example figure above a new column 'SignalA' of type FLOAT(8,4) is added into the table 'sampleA' after the column 'Probe\_Set\_ID'.

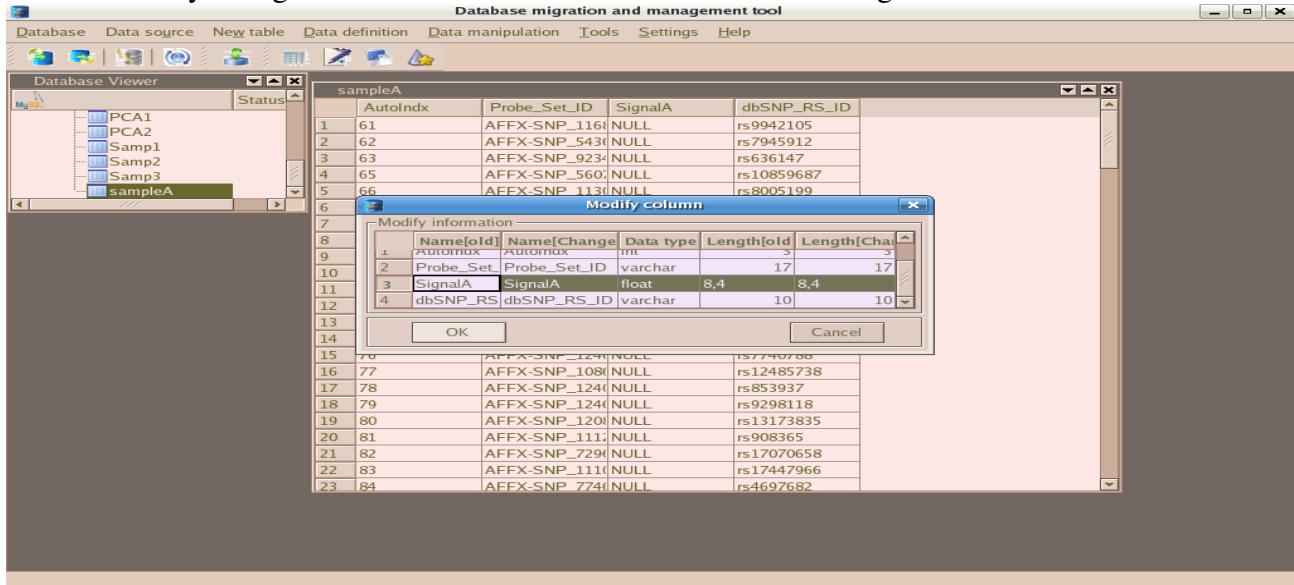
Just remember, length value of a column must be specified correctly so that the column can hold maximum length value stored in it.

After 'OK' button is clicked the new column will be added at its proper position as shown in the figure 3.2.1.4.3 below.

AutoIndex	Probe_Set_ID	SignalA	dbSNP_RS_ID
1	AFFX-SNP_116	NULL	rs9942105
2	AFFX-SNP_543	NULL	rs7945912
3	AFFX-SNP_923	NULL	rs636147
4	AFFX-SNP_560	NULL	rs10859687
5	AFFX-SNP_113	NULL	rs8005199
6	AFFX-SNP_716	NULL	rs1491155
7	AFFX-SNP_716	NULL	rs2403901
8	AFFX-SNP_715	NULL	—
9	AFFX-SNP_103	NULL	rs7149354
10	AFFX-SNP_862	NULL	rs11639517
11	AFFX-SNP_122	NULL	rs9685861
12	AFFX-SNP_114	NULL	rs6519378
13	AFFX-SNP_108	NULL	rs12544032
14	AFFX-SNP_124	NULL	rs17046094
15	AFFX-SNP_124	NULL	rs7740788
16	AFFX-SNP_108	NULL	rs12485738
17	AFFX-SNP_124	NULL	rs853937
18	AFFX-SNP_124	NULL	rs9298118
19	AFFX-SNP_120	NULL	rs13173835
20	AFFX-SNP_111	NULL	rs908365
21	AFFX-SNP_729	NULL	rs17070658
22	AFFX-SNP_111	NULL	rs17447966
23	AFFX-SNP_774	NULL	rs4697682

**Figure 3.2.1.4.3: table 'sampleA' after adding column 'SignalA'**

**c) Column modification:** Select 'Column -> modification' option from 'Data definition' menu bar. A dialog as shown in the figure 3.2.1.4.4 below will be prompted, asking to make necessary changes to the column attributes. As shown in the figure below attributes of the



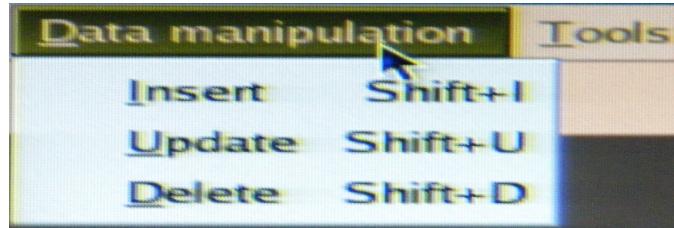
d) **Column deletion:** Select a column as shown in the figure 3.2.1.4.6 below:

	AutoIndx	Probe_Set_ID	SignalAB	dbSNP_RS_ID
1	61	AFFX-SNP_116	NULL	rs9942105
2	62	AFFX-SNP_543	NULL	rs7945912
3	63	AFFX-SNP_923	NULL	rs636147
4	65	AFFX-SNP_560	NULL	rs10859687
5	66	AFFX-SNP_113	NULL	rs8005199
6	67	AFFX-SNP_716	NULL	rs1491155
7	68	AFFX-SNP_716	NULL	rs2403901
8	69	AFFX-SNP_715	NULL	---
9	70	AFFX-SNP_103	NULL	rs7149354
10	71	AFFX-SNP_862	NULL	rs11639517
11	72	AFFX-SNP_122	NULL	rs9685861
12	73	AFFX-SNP_114	NULL	rs6519378
13	74	AFFX-SNP_108	NULL	rs12544032
14	75	AFFX-SNP_124	NULL	rs17046094
15	76	AFFX-SNP_124	NULL	rs7740788
16	77	AFFX-SNP_108	NULL	rs12485738
17	78	AFFX-SNP_124	NULL	rs853937
18	79	AFFX-SNP_124	NULL	rs9298118
19	80	AFFX-SNP_120	NULL	rs13173835
20	81	AFFX-SNP_111	NULL	rs908365
21	82	AFFX-SNP_729	NULL	rs17070658
22	83	AFFX-SNP_111	NULL	rs17447966
23	84	AFFX-SNP_774	NULL	rs4697682

**Figure 3.2.1.4.6: table 'sampleA' before column deletion**

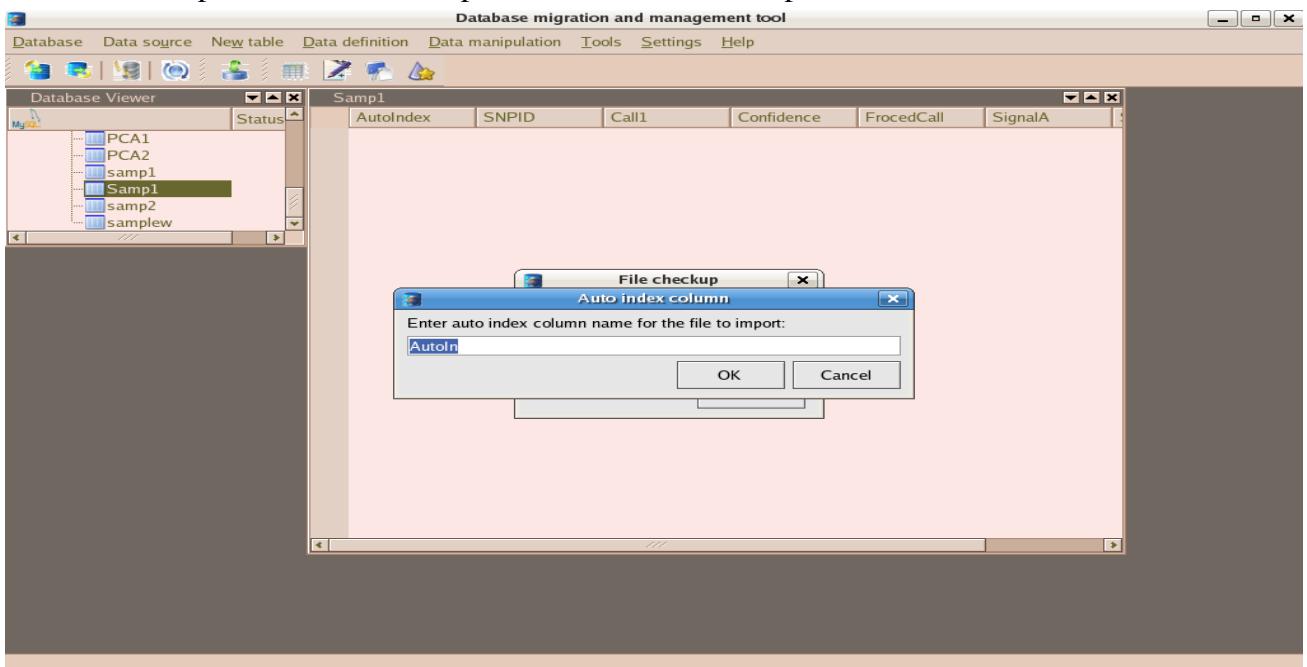
Select 'Column -> drop' option from 'Data definition' menu bar. The selected column will be deleted.

**3.2.1.5 Data manipulation:** Data manipulation menu bar options are as shown in the figure below.



i) **Steps to insert data in the newly created table:**

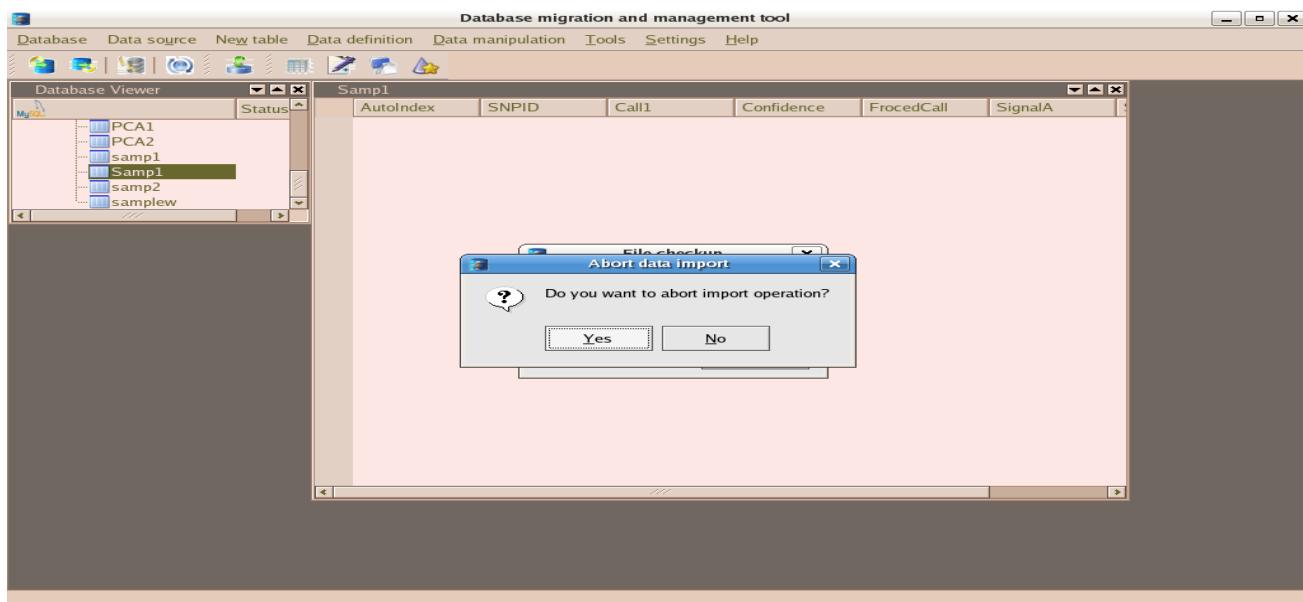
**Step 1:** After creating a new table successfully click the 'Refresh database connection' button, then open the table you created under the database you specified. When the table is displayed, there will be no data in the table. Now, select 'Insert' option under the 'Data manipulation' menu bar option. Select the 'Insert' option.



**Figure 3.2.1.5.1: First step to insert data in the table 'Samp1'**

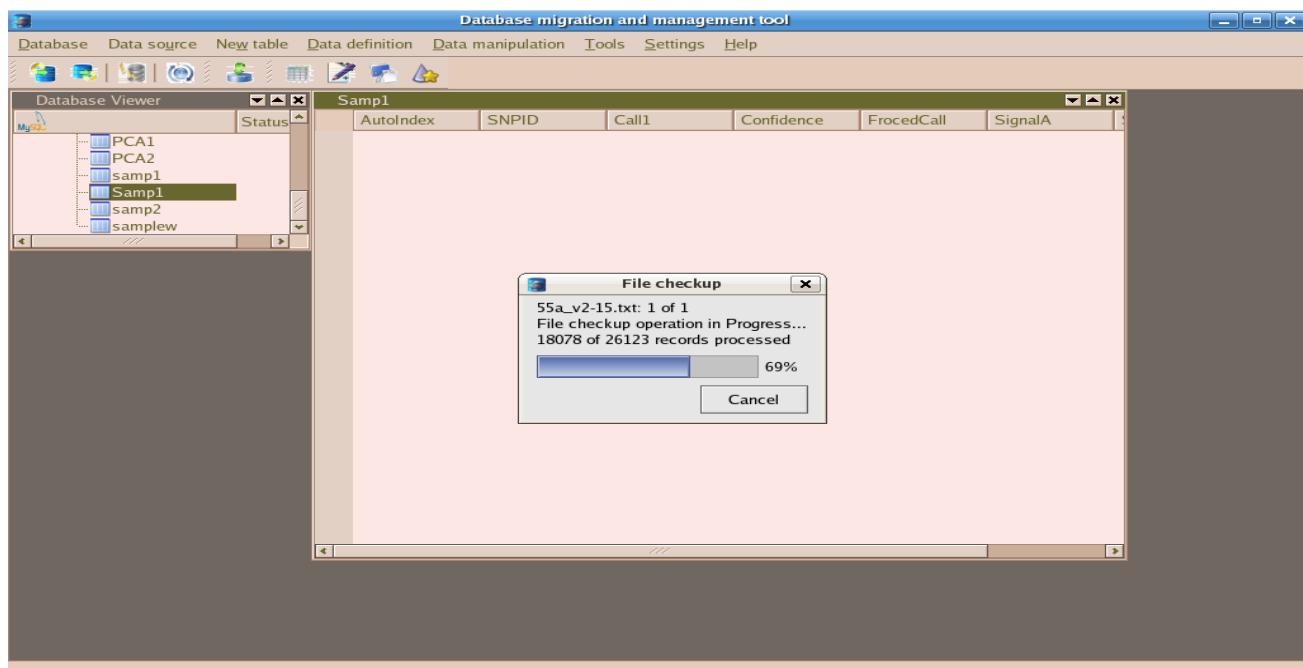
**Step 2:** A 'Auto index column' dialog will appear as shown in the figure 3.2.1.5.1 above.

An auto index column name is required for the data file to import(it is required to preserve the order). A default name for 'auto index' column is given. You can accept it or can give new name. Whatever may be, from this step if you want to abort this table update operation then click the 'Cancel' button(See the figure 3.2.1.5.2 below). Click the 'OK' button to proceed to the next step. In Step 3 file checkup operation will be started as shown in the figure 3.2.1.5.3 below.



**Figure 3.2.1.5.2: 'Abort data import' dialog**

**Step 3:** In this step input data file will be processed/checked up before import operation.



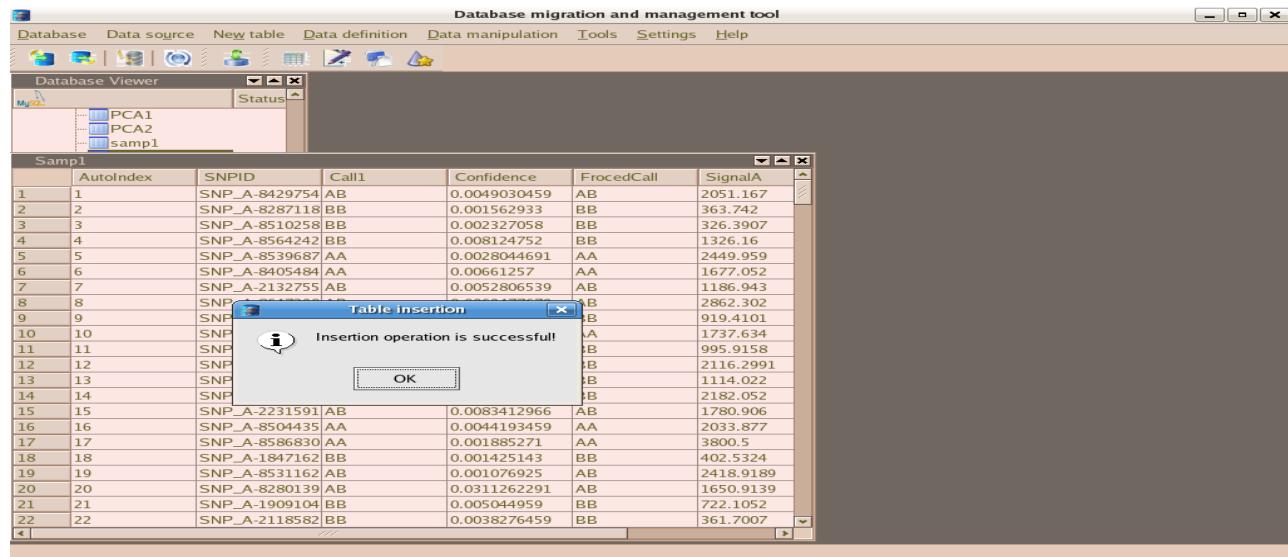
**Figure 3.2.1.5.3: File checkup operation**

This file processing or check up operation involves asking user to change any column name which conflicts with any database reserve word name. In this example our application does not prompt for change any field name. There are two possible reasons. Either no field name ~ database reserve word conflict occurs or any previously running event in our application which pass through this option, and changes made that time was preserved by our application. That's why this time our application has made the necessary changes from that

preserved informations.

Filling up empty space/cell with “XX” is also done at the time of input file check up operation. You can change “XX” with desired value later in the database table.

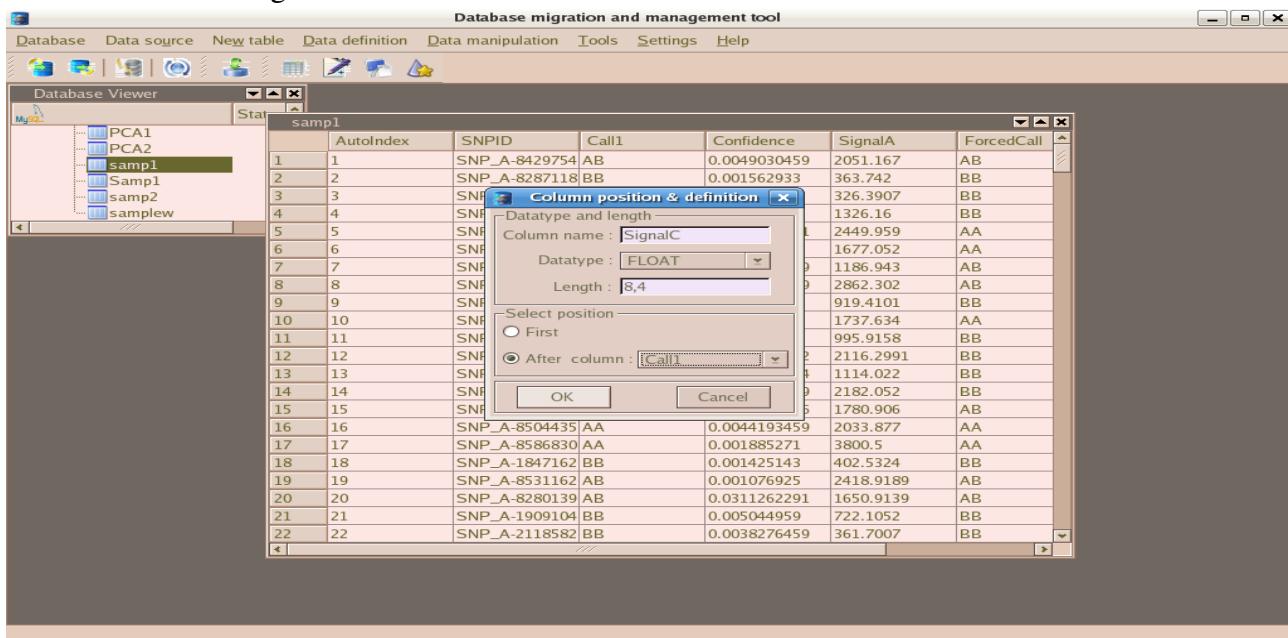
**Step 4:** Completion of the Insert operation will be as shown in the figure 3.2.1.5.4 below:



**Figure 3.2.1.5.4: Successful table insertion status**

## ii) Steps to update data in the table:

**Step 1:** Open the table, then follow the main menu options, Data definition -> Column -> add. A dialog will appear asking to provide information for creating new column as shown in the figure 3.2.1.5.5 below.



**Figure 3.2.1.5.5: Column position and definition**

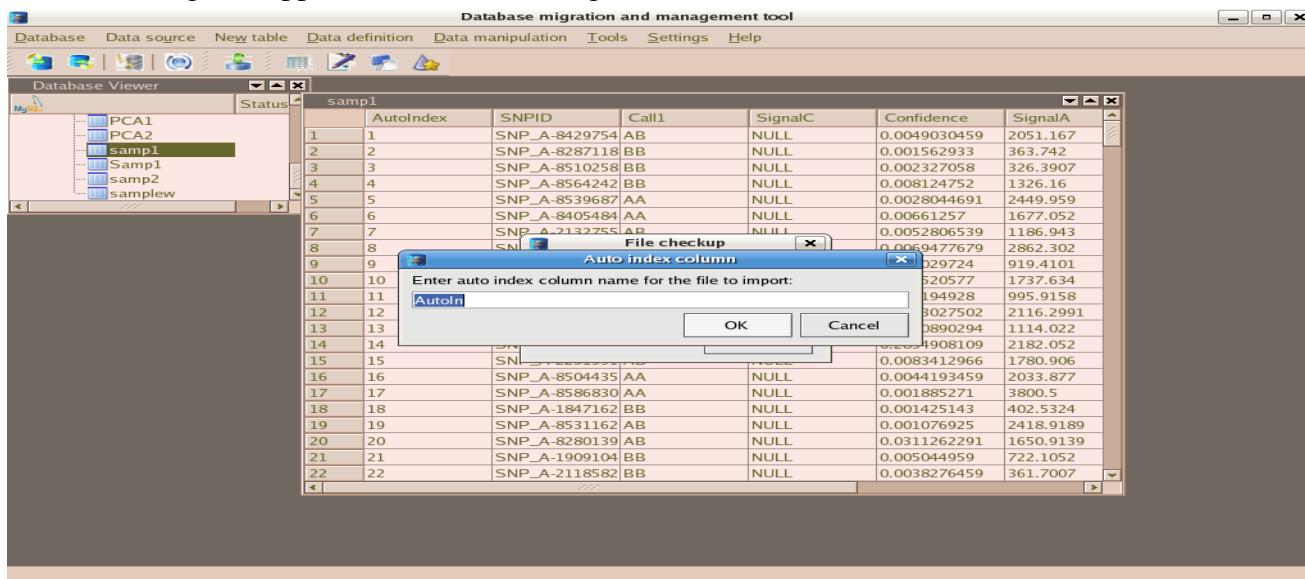
Dialog is very much user friendly. So, you can easily provide required information. Just remember, length value of a column must be specified correctly so that the column can hold maximum length value stored in it. Then press 'OK' button. New column will be created in the specified position as shown in the figure 3.2.1.5.6 below.

	AutoIndex	SNPID	Call1	SignalC	Confidence	SignalA
1	1	SNP_A-8429754 AB	NULL	0.0049030459	2051.167	
2	2	SNP_A-8287118 BB	NULL	0.001562933	363.742	
3	3	SNP_A-8510258 BB	NULL	0.002327058	326.3907	
4	4	SNP_A-8564242 BB	NULL	0.008124752	1326.16	
5	5	SNP_A-8539687 AA	NULL	0.0028044691	2449.959	
6	6	SNP_A-8405484 AA	NULL	0.00661257	1677.052	
7	7	SNP_A-2132755 AB	NULL	0.0052806539	1186.943	
8	8	SNP_A-8647290 AB	NULL	0.0069477679	2862.302	
9	9	SNP_A-8566349 BB	NULL	0.002029724	919.4101	
10	10	SNP_A-2186168 AA	NULL	0.003520577	1737.634	
11	11	SNP_A-8522990 BB	NULL	0.001194928	995.9158	
12	12	SNP_A-8653362 BB	NULL	0.0203027502	2116.2991	
13	13	SNP_A-8433169 BB	NULL	0.0260890294	1114.022	
14	14	SNP_A-8702287 No	NULL	0.2854908109	2182.052	
15	15	SNP_A-2231591 AB	NULL	0.0083412966	1780.906	
16	16	SNP_A-8504435 AA	NULL	0.0044193459	2033.877	
17	17	SNP_A-8586830 AA	NULL	0.001885271	3800.5	
18	18	SNP_A-1847162 BB	NULL	0.001425143	402.5324	
19	19	SNP_A-8531162 AB	NULL	0.001076925	2418.9189	
20	20	SNP_A-8280139 AB	NULL	0.0311262291	1650.9139	
21	21	SNP_A-1909104 BB	NULL	0.005044959	722.1052	
22	22	SNP_A-2118582 BB	NULL	0.0038276459	361.7007	

**Figure 3.2.1.5.6: New column 'SignalC' at its proper position**

**Step 2:** Now take a data file as input through 'Data input dialog' with 'Table direct' option selected. The selected data file must contains same number of rows as in the table.

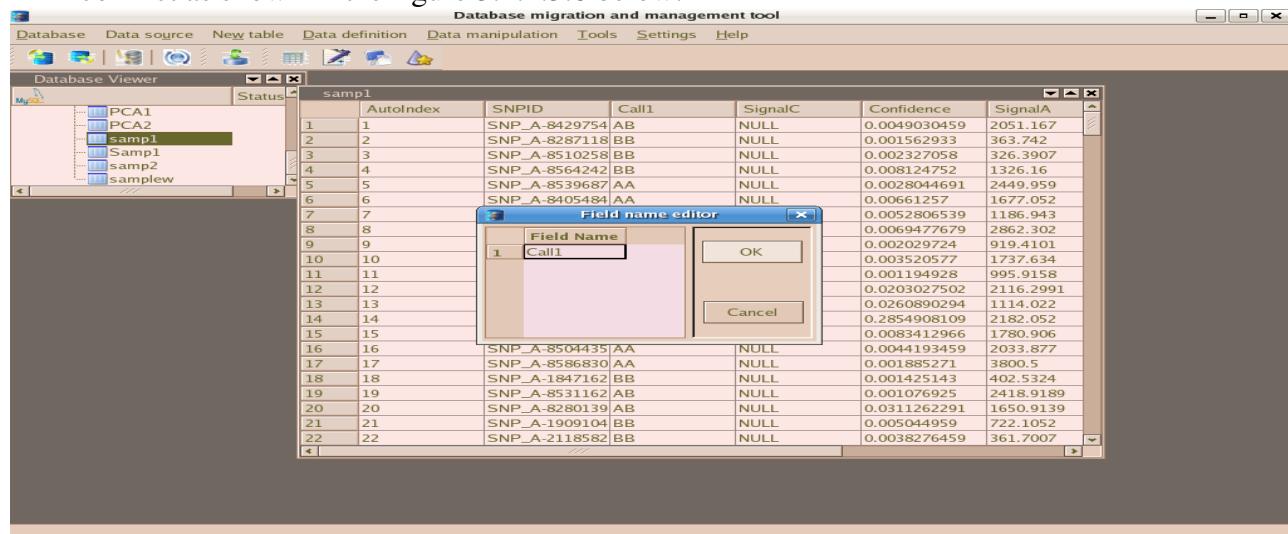
**Step 3:** Follow the 'Data manipulation' menu option. There, you select 'Update' option. A dialog will appear as shown in the figure 3.2.1.5.7 below:



**Figure 3.2.1.5.7: First step to update table 'Samp1'**

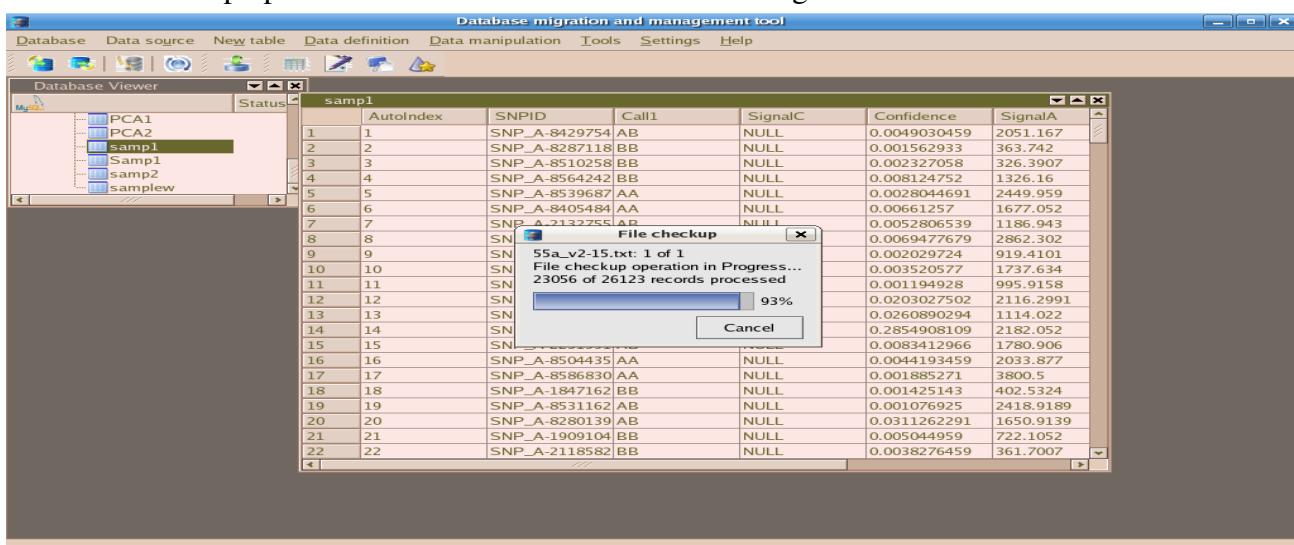
An auto index column name is required for the data file to import(it is required to preserve the order). A default name for 'auto index' column is given. You can accept it or can give new name. Whatever may be, from this step if you want to abort this table update operation then click the 'Cancel' button. Click the 'OK' button to proceed to the next step.

**Step 4:** In this step input data file will be processed/checked up before import operation. This file processing operation involves asking user to change any column name which conflicts with any database reserve word name. Filling up empty space/cell with “XX”. Here, in this example a column name 'Call' is found. But this name conflicts with database reserve word 'Call'. So, our application will prompt user to change the column/field name to avoid this conflict as shown in the figure 3.2.1.5.8 below:



**Figure 3.2.1.5.8: Change field/column name from 'call' to 'call1'**

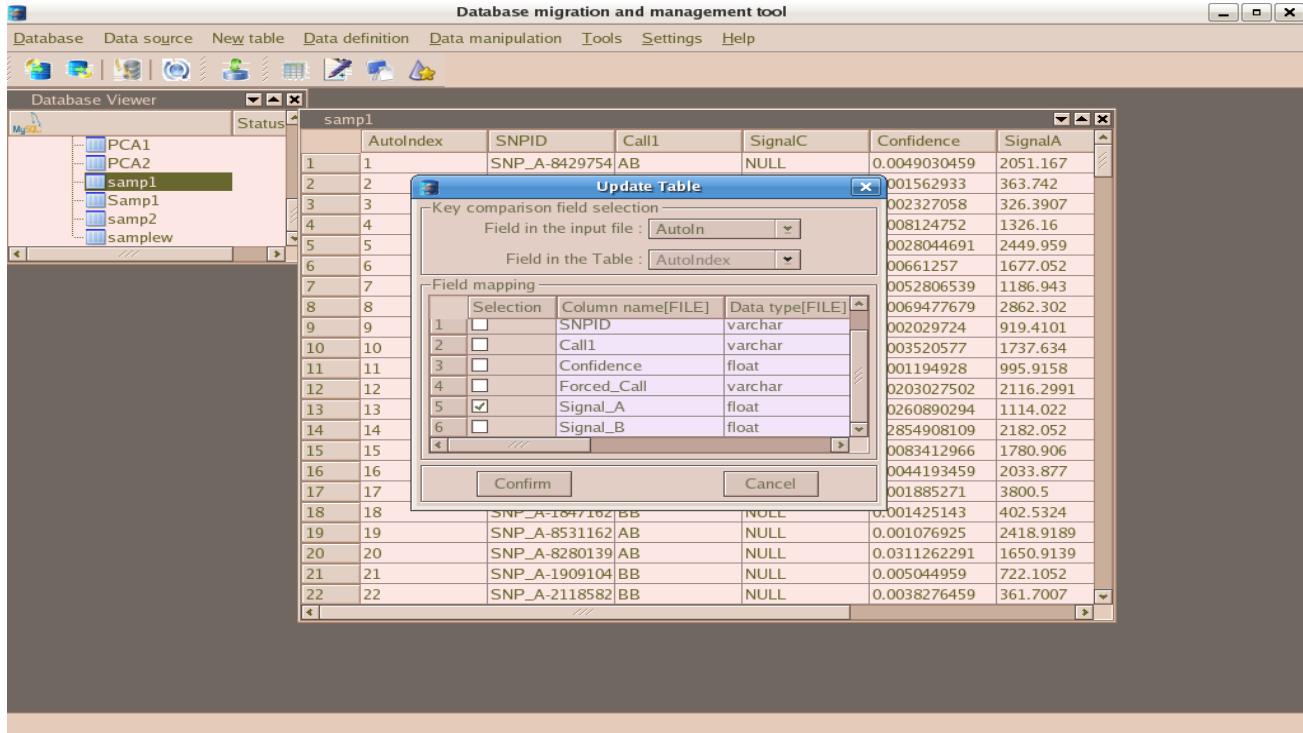
If the changed value does not conflict with database reserve words then on clicking 'OK' button file checkup operation will be started as shown in the figure 3.2.1.5.9 below.



**Figure 3.2.1.2.5.9: File checkup operation**

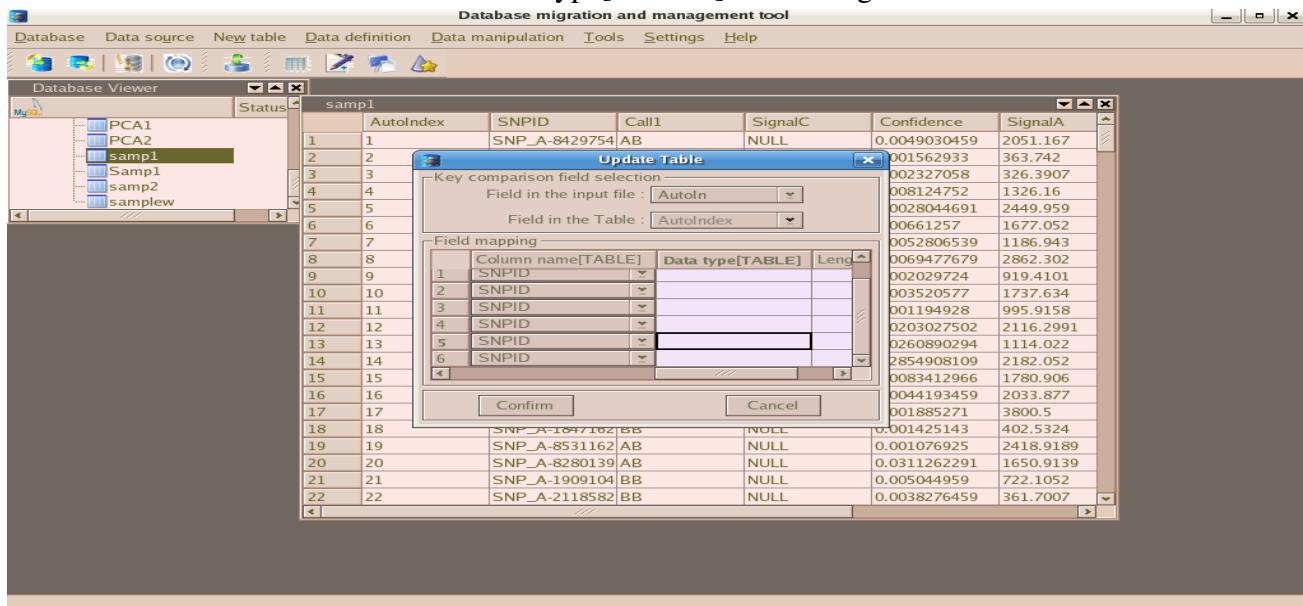
After this operation is completed successfully we will proceed to the next step.

**Step 5:** It is an important step of this update operation. Primary key field in the table is



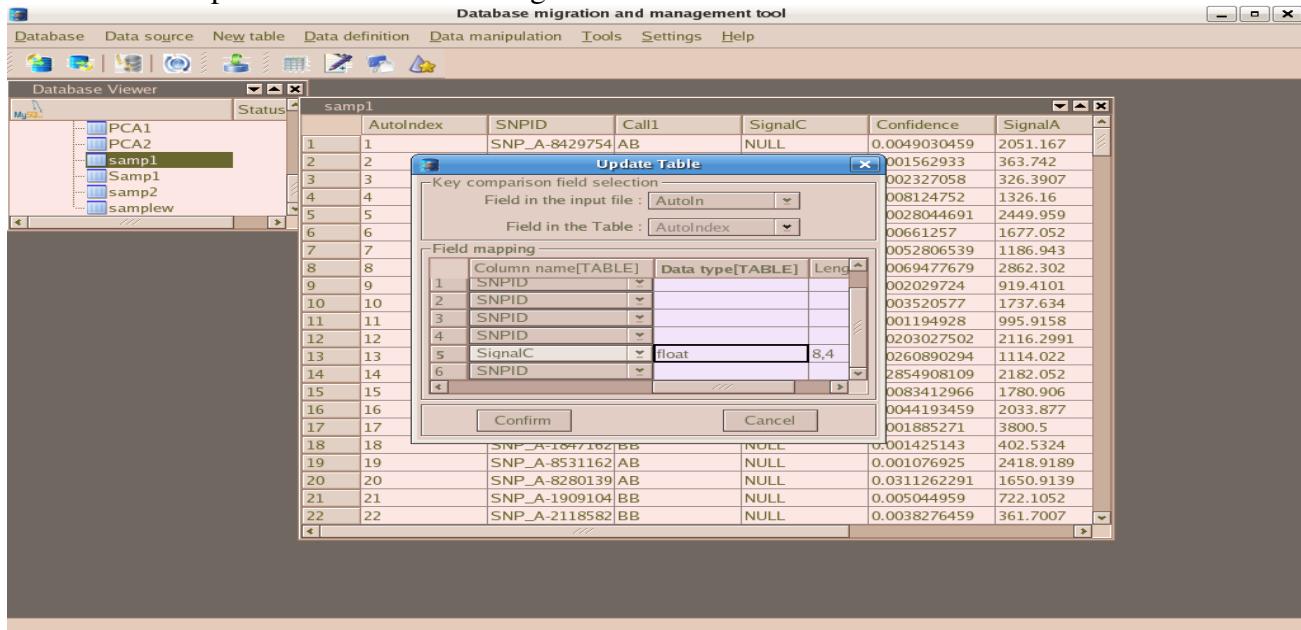
**Figure 3.2.1.5.10: Table update linkage dialog(1)**

automatically selected and is shown in disable mode (See figure 3.2.1.5.10 above). You have to select the key field in the input file. By default in our application first field/column in the input file or in a table is considered as key field. Next, select a field from the input file to import into a column in the table. As shown in the figure above, at 5<sup>th</sup> row Signal\_A is selected from the input file to import its data into the column (See figure 3.2.1.5.11 below) to be selected. First select the cell under the 'Data type[TABLE]' column against the 5<sup>th</sup> row as shown in



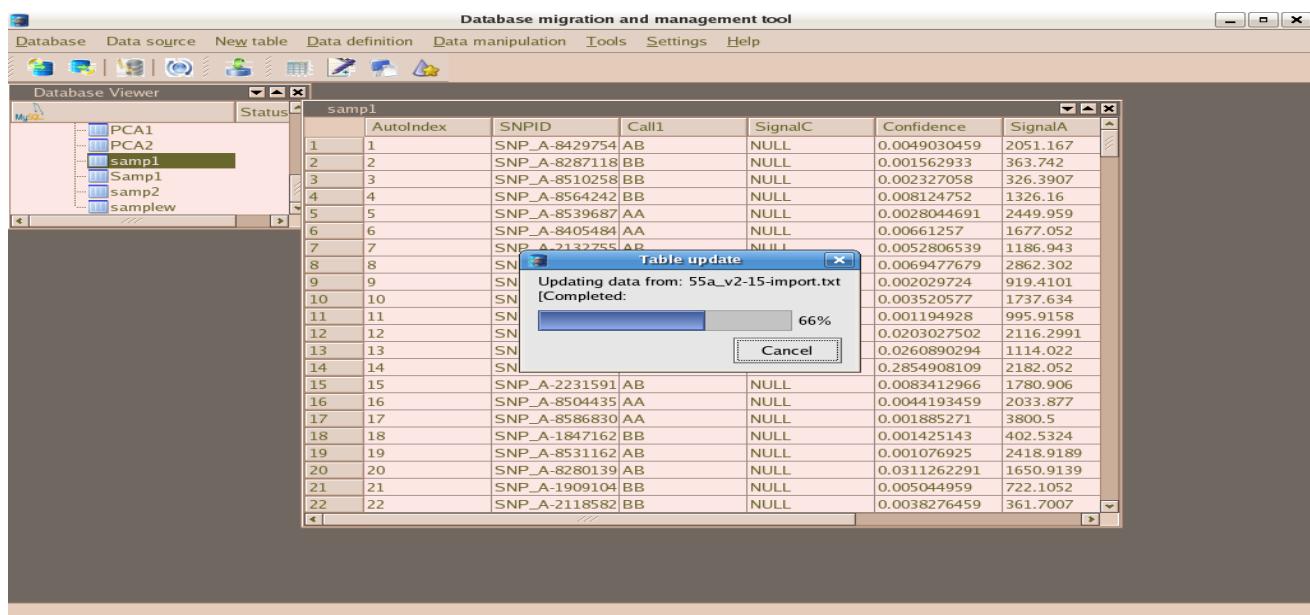
**Figure 3.2.1.5.11: Table update linkage dialog(2)**

the figure above. Then from the pop up list attached in the column 'Column name[TABLE]' select appropriate column where values from the selected field/s from the data file will be inserted/updated as shown in the figure 3.2.1.5.12 below.



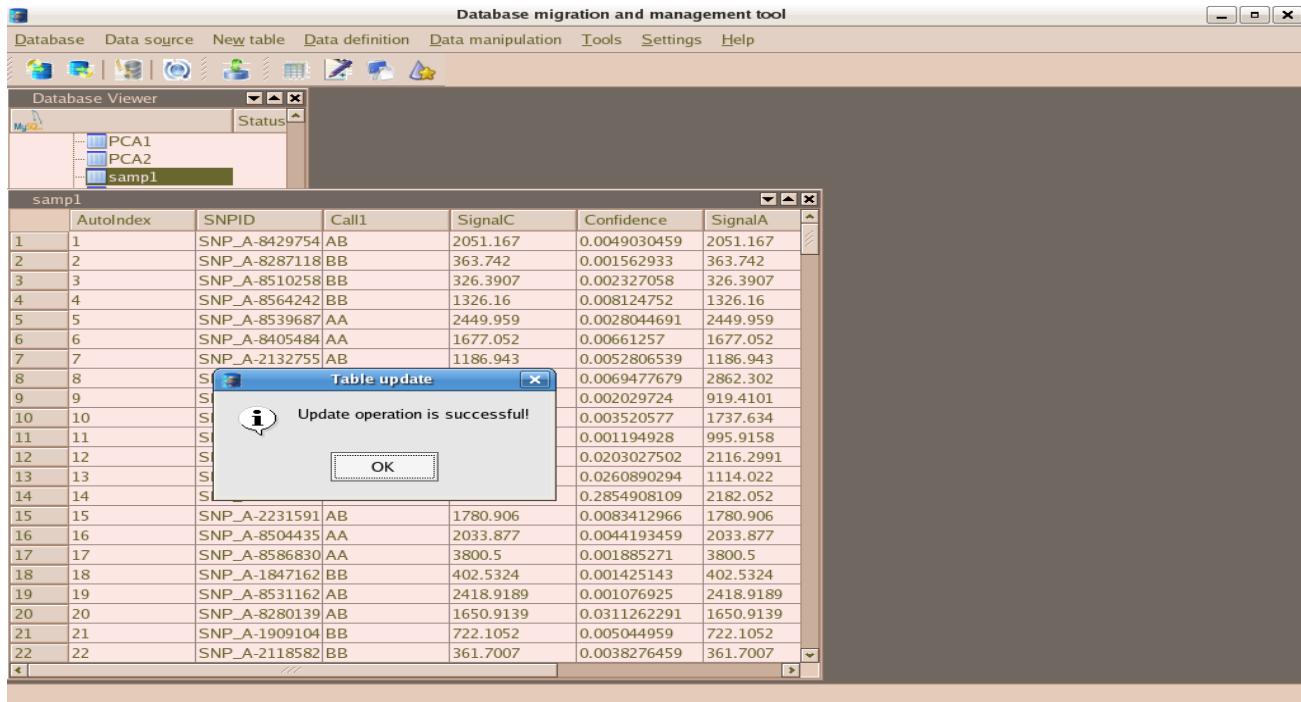
**Figure 3.2.1.5.12: Table update linkage dialog(3)**

Remember if the selected column in the table is empty then values will be inserted or if the column is not empty then values will be updated. If you need to link more field/s -> column/s, do it in the same way as described above. Then click the 'Confirm' button. If all links are made correctly then table update operation will be started. Its progress will be shown as in the figure 3.2.1.5.13 below.



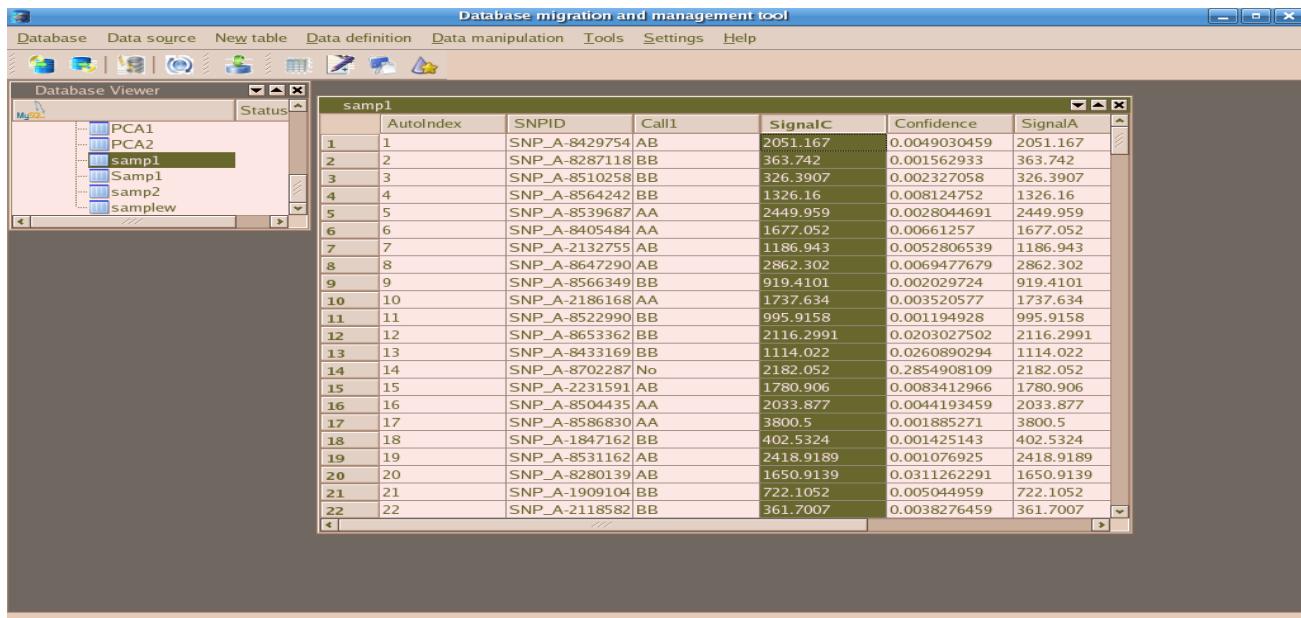
**Figure 3.2.1.5.13: Table update operation in progress**

**Step 6:** Completion of the update operation will be as shown in the figure 3.2.1.5.14 below.



**Figure 3.2.1.5.14: Table update status**

You can check the table whether it is properly updated or not. In our example the newly created column 'SignalC' is updated with values from 'Signal\_A' field from the data file taken as input. See the figure 3.2.1.5.15 below. Column 'SignalC' is highlighted.



**Figure 3.2.1.5.15: Column 'SignalC' is updated**

iii) **Steps to delete data from the table:**

**Step 1:** Open any table from any database available. In the given example table named 'Samp3' is opened from database 'ww' as shown in the figure 3.2.1.5.16 below:

	AutoIndex	SNPID	Call1	Confidence	ForcedCall	SignalA
1	1	SNP_A-8429754	AB	0.0049030459	AB	2051.167
2	2	SNP_A-8287118	BB	0.001562933	BB	363.742
3	3	SNP_A-8510258	BB	0.002327058	BB	326.3907
4	4	SNP_A-8564242	BB	0.008124752	BB	1326.16
5	5	SNP_A-8539687	AA	0.0028044691	AA	2449.959
6	6	SNP_A-8405484	AA	0.00661257	AA	1677.052
7	7	SNP_A-2132755	AB	0.0052806539	AB	1186.943
8	8	SNP_A-8647290	AB	0.0069477679	AB	2862.302
9	9	SNP_A-8566349	BB	0.002029724	BB	919.4101
10	10	SNP_A-2186168	AA	0.003520577	AA	1737.634
11	11	SNP_A-8522990	BB	0.001194928	BB	995.9158
12	12	SNP_A-8653362	BB	0.0203027502	BB	2116.2991
13	13	SNP_A-8433169	BB	0.0260890294	BB	1114.022
14	14	SNP_A-8702287	No	0.2854908109	BB	2182.052
15	15	SNP_A-2231591	AB	0.0083412966	AB	1780.906
16	16	SNP_A-8504435	AA	0.0044193459	AA	2033.877
17	17	SNP_A-8586830	AA	0.001885271	AA	3800.5
18	18	SNP_A-1847162	BB	0.001425143	BB	402.5324
19	19	SNP_A-8531162	AB	0.001076925	AB	2418.9189
20	20	SNP_A-8280139	AB	0.0311262291	AB	1650.9139
21	21	SNP_A-1909104	BB	0.005044959	BB	722.1052
22	22	SNP_A-2118582	BB	0.0038276459	BB	361.7007
23	23	SNP_A-1860023	BB	0.0306429307	BB	675.55

**Figure 3.2.1.5.16: Table 'Samp3' before a set of full row deletion**

**Step 2(Full row deletion):** In the above figure rows from 4 to 11 are selected for deletion. Here, carefully note row ids 1 to 3, then 4 to 11. Row id portion is different in this two sets. After 'Delete' operation is performed from 'Data manipulation' menu bar option table will be shown as in the figure 3.2.1.5.17 below.

	AutoIndex	SNPID	Call1	Confidence	ForcedCall	SignalA
1	1	SNP_A-8429754	AB	0.0049030459	AB	2051.167
2	2	SNP_A-8287118	BB	0.001562933	BB	363.742
3	3	SNP_A-8510258	BB	0.002327058	BB	326.3907
4	12	SNP_A-8653362	BB	0.0203027502	BB	2116.2991
5	13	SNP_A-8433169	BB	0.0260890294	BB	1114.022
6	14	SNP_A-8702287	No	0.2854908109	BB	2182.052
7	15	SNP_A-2231591	AB	0.0083412966	AB	1780.906
8	16	SNP_A-8504435	AA	0.0044193459	AA	2033.877
9	17	SNP_A-8586830	AA	0.001885271	AA	3800.5
10	18	SNP_A-1847162	BB	0.001425143	BB	402.5324
11	19	SNP_A-8531162	AB	0.001076925	AB	2418.9189
12	20	SNP_A-8280139	AB	0.0311262291	AB	1650.9139
13	21	SNP_A-1909104	BB	0.005044959	BB	722.1052
14	22	SNP_A-2118582	BB	0.0038276459	BB	361.7007
15	23	SNP_A-1860023	BB	0.0306429307	BB	675.55
16	24	SNP_A-8490595	BB	0.0054557198	BB	263.8986
17	25	SNP_A-8345721	No	0.1724666953	AA	1090.421
18	26	SNP_A-8519696	BB	0.0025761321	BB	764.1838
19	27	SNP_A-2065823	No	0.2346155941	AA	875.8677
20	28	SNP_A-8499139	No	0.1456467062	BB	1382.3879
21	29	SNP_A-8516207	AA	0.0081638712	AA	2796.5559
22	30	SNP_A-8387814	AB	0.0065126359	AB	895.1033

**Figure 3.2.1.5.17: Table 'Samp3' after a set of full row deletion**

**Step 3(Partial or cell wise deletion):** Now see figure 3.2.1.5.18 below where a set of cells are selected for deletion.

	AutoIndex	SNPID	Call1	Confidence	ForcedCall	SignalA	
1	1	SNP_A-8429754	AB	0.0049030459	AB	2051.167	
2	2	SNP_A-8287118	BB	0.001562933	BB	363.742	
3	3	SNP_A-8510258	BB	0.002327058	BB	326.3907	
4	12	SNP_A-8653362	BB	0.0203027502	BB	2116.2991	
5	13	SNP_A-8433169	BB	0.0260890294	BB	1114.022	
6	14	SNP_A-8702287	No	0.2854908109	BB	2182.052	
7	15	SNP_A-2231591	AB	0.0083412966	AB	1780.906	
8	16	SNP_A-8504435	AA	0.0044193459	AA	2033.877	
9	17	SNP_A-8586830	AA	0.001885271	AA	3800.5	
10	18	SNP_A-1847162	BB	0.001425143	BB	402.5324	
11	19	SNP_A-8531162	AB	0.001076925	AB	2418.9189	
12	20	SNP_A-8280139	AB	0.0311262291	AB	1650.9139	
13	21	SNP_A-1909104	BB	0.005044959	BB	722.1052	
14	22	SNP_A-2118582	BB	0.0038276459	BB	361.7007	
15	23	SNP_A-1860023	BB	0.0306429397	BB	675.55	
16	24	SNP_A-8490595	BB	0.0054557198	BB	263.8986	
17	25	SNP_A-8345721	No	0.1724666953	AA	1090.421	
18	26	SNP_A-8519696	BB	0.0025761321	BB	764.1838	
19	27	SNP_A-2065823	No	0.2346155941	AA	875.8677	
20	28	SNP_A-8499139	No	0.1456467062	BB	1382.3879	
21	29	SNP_A-8516207	AA	0.0081638712	AA	2796.5559	
22	30	SNP_A-8387814	AB	0.0065126359	AB	895.1033	

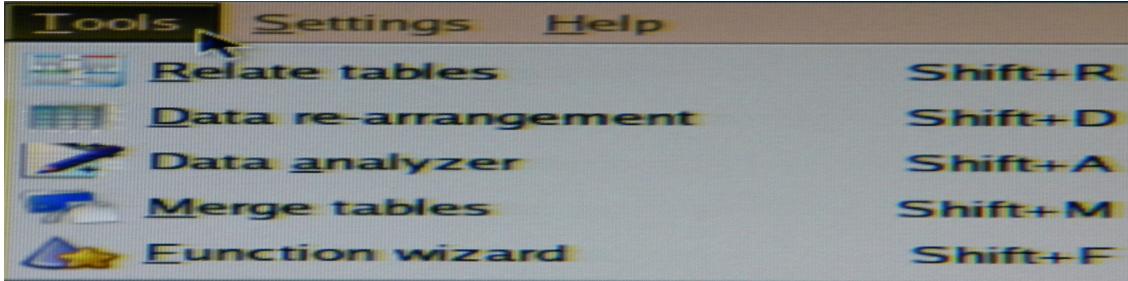
**Figure 3.2.1.5.18: Table 'Samp3' before a set of partial deletion**

Here, after 'Delete' operation is performed from 'Data manipulation' menu bar option table will be shown as in the figure 3.2.1.5.18 below.

	AutoIndex	SNPID	Call1	Confidence	ForcedCall	SignalA	
1	1	SNP_A-8429754	AB	0.0049030459	AB	2051.167	
2	2	SNP_A-8287118	BB	0.001562933	BB	363.742	
3	3	SNP_A-8510258	BB	0.002327058	BB	326.3907	
4	12	SNP_A-8653362	BB	0.0203027502	BB	2116.2991	
5	13	0	0	0	0	1114.022	
6	14	0	0	0	0	2182.052	
7	15	0	0	0	0	1780.906	
8	16	0	0	0	0	2033.877	
9	17	0	0	0	0	3800.5	
10	18	0	0	0	0	402.5324	
11	19	0	0	0	0	2418.9189	
12	20	0	0	0	0	1650.9139	
13	21	0	0	0	0	722.1052	
14	22	0	0	0	0	361.7007	
15	23	0	0	0	0	675.55	
16	24	SNP_A-8490595	BB	0.0054557198	BB	263.8986	
17	25	SNP_A-8345721	No	0.1724666953	AA	1090.421	
18	26	SNP_A-8519696	BB	0.0025761321	BB	764.1838	
19	27	SNP_A-2065823	No	0.2346155941	AA	875.8677	
20	28	SNP_A-8499139	No	0.1456467062	BB	1382.3879	
21	29	SNP_A-8516207	AA	0.0081638712	AA	2796.5559	
22	30	SNP_A-8387814	AB	0.0065126359	AB	895.1033	

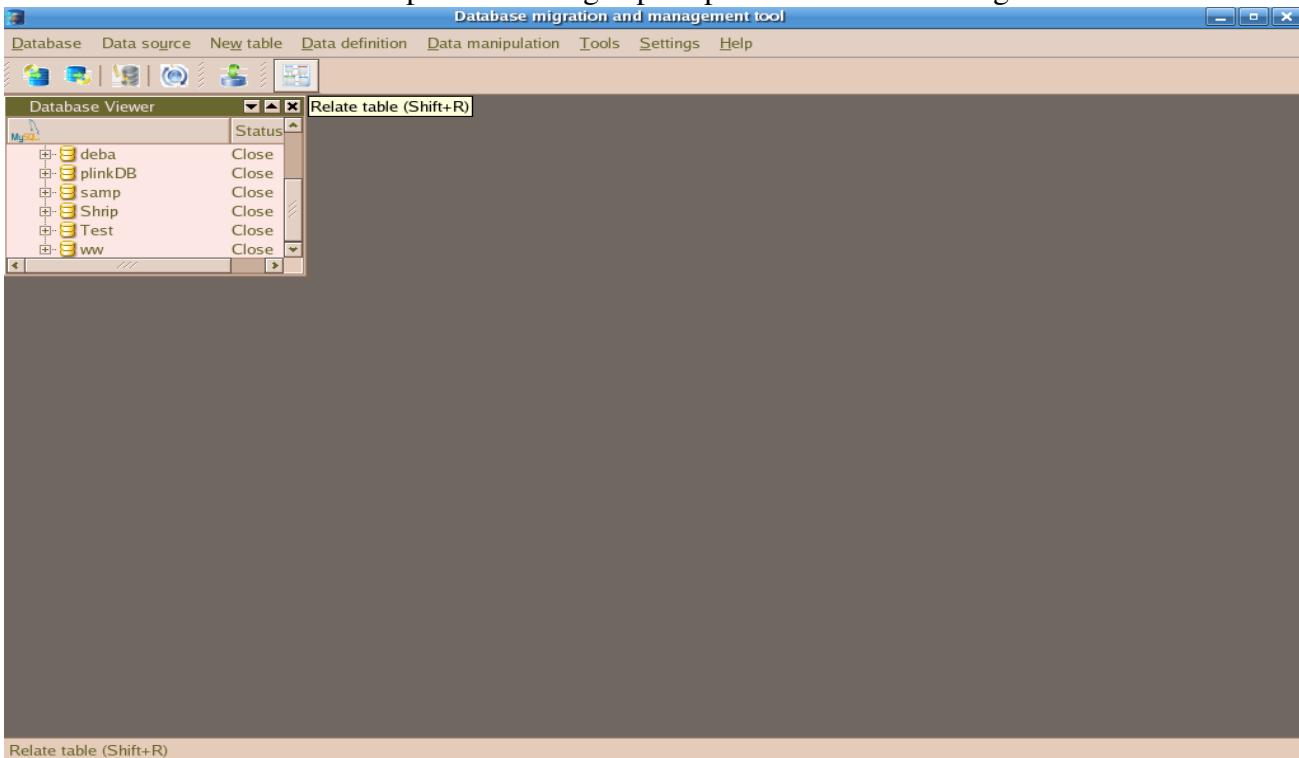
**Figure 3.2.1.5.18: Table 'Samp3' after a set of partial deletion**

**3.2.1.6 Tools:** Tools menu bar options are as shown in the figure below.



- **Relate Tables:** This menu option allows user to create relations among tables manually.

As shown in the figure 3.2.1.6.A.1 below click on the button “Relate tables” or follow 'Tools -> Relate tables' menu bar option. A dialog is prompted as shown in the figure 3.2.1.6.A.2 below.



**Figure 3.2.1.6.A.1: Table Relation Establishment(1)**

Here, you follow these steps carefully:

**Step 1:** Relate two tables: Select a database. Tables in that database will be shown in the drop down list box under labels “Foreign Key” & “References”.

**Step 2:** Select “Foreign Key” & “References” tables(must be different).

**Step 3:** Select appropriate fields to relate.

**Step 4:** Click on 'Create Relation' button and follow instructions(see while running the application).

**Step 5:** If the relation is established, it will be shown in the table.

**[Important:** If you want to open the “Data Analyzer” dialog(coming in the next section) you must tick the tick box “Mark when all possible relationships are established”. Unless it is ticked, you can't open the “Data Analyzer” dialog. “Mark when all possible relationships are established” -- this label of this box signifies that you should tick this box only after creating all possible relations among database tables so that when you delete a row from a table then our application takes care to delete corresponding rows from all of its 'foreign key' tables. If you can't create any such relation but still you need to open the “Data Analyzer” dialog then also tick this button.]

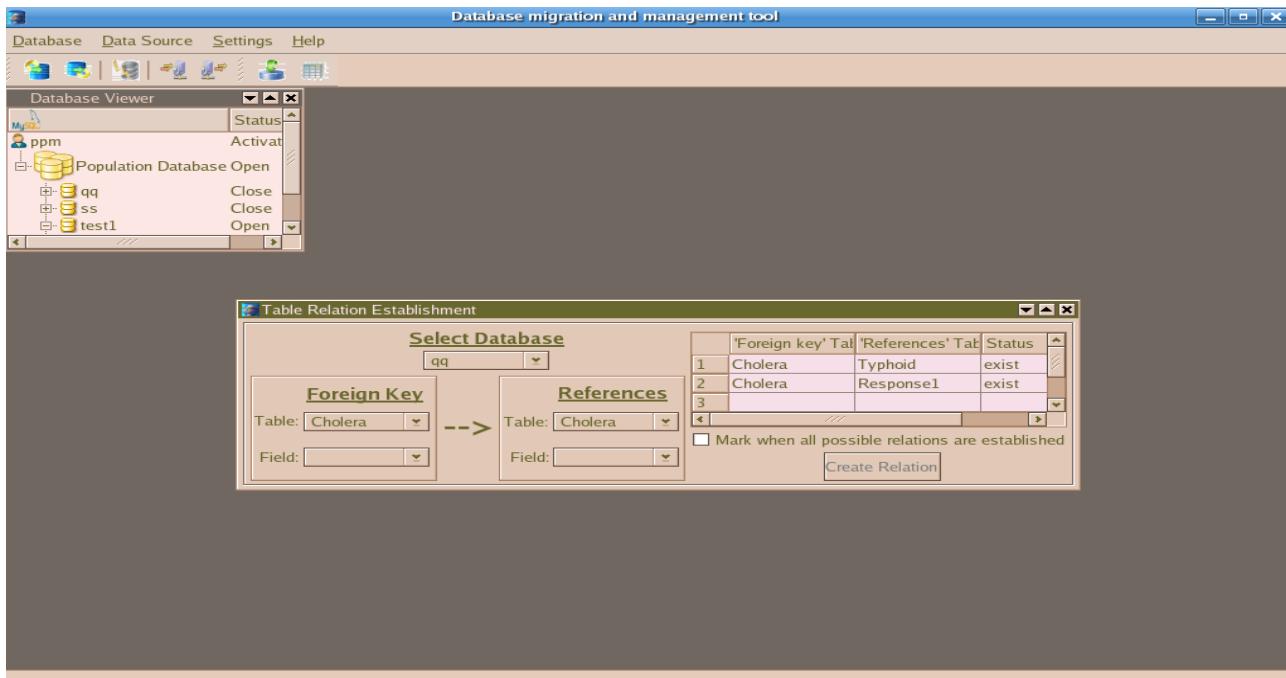


Figure 3.2.1.6.A.2: Table Relation Establishment(2)

**How to break relation between two tables?** By example, see above dialog. If you want to break relation between tables 'Cholera' and 'Typhoid', right click on any column from first row and click on 'Yes' button to remove the row.

- **Data re-arrangement:** If you have a 'key file' and a 'data file' having formats as given below:

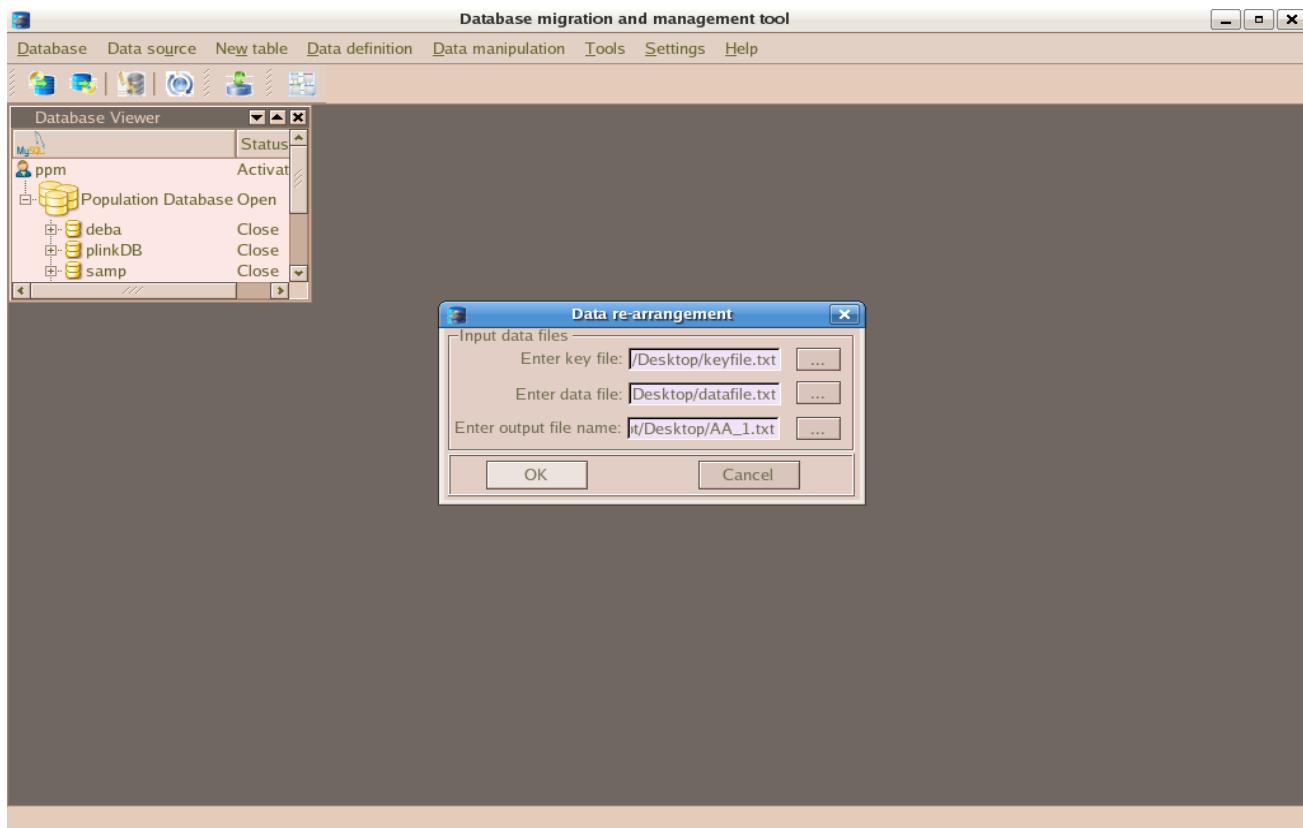
```
AutoIn SNPID
1      SNP_A-8429754
2      SNP_A-8287118
3      SNP_A-8510258
4      SNP_A-8564242
5      SNP_A-8539687
6      SNP_A-8405484
7      SNP_A-2132755
8      SNP_A-8647290
9      SNP_A-8566349
10     SNP_A-2186168
11     SNP_A-8522990
12     SNP_A-8653362
13     SNP_A-8433169
14     SNP_A-8702287
15     SNP_A-2231591
```

### key file

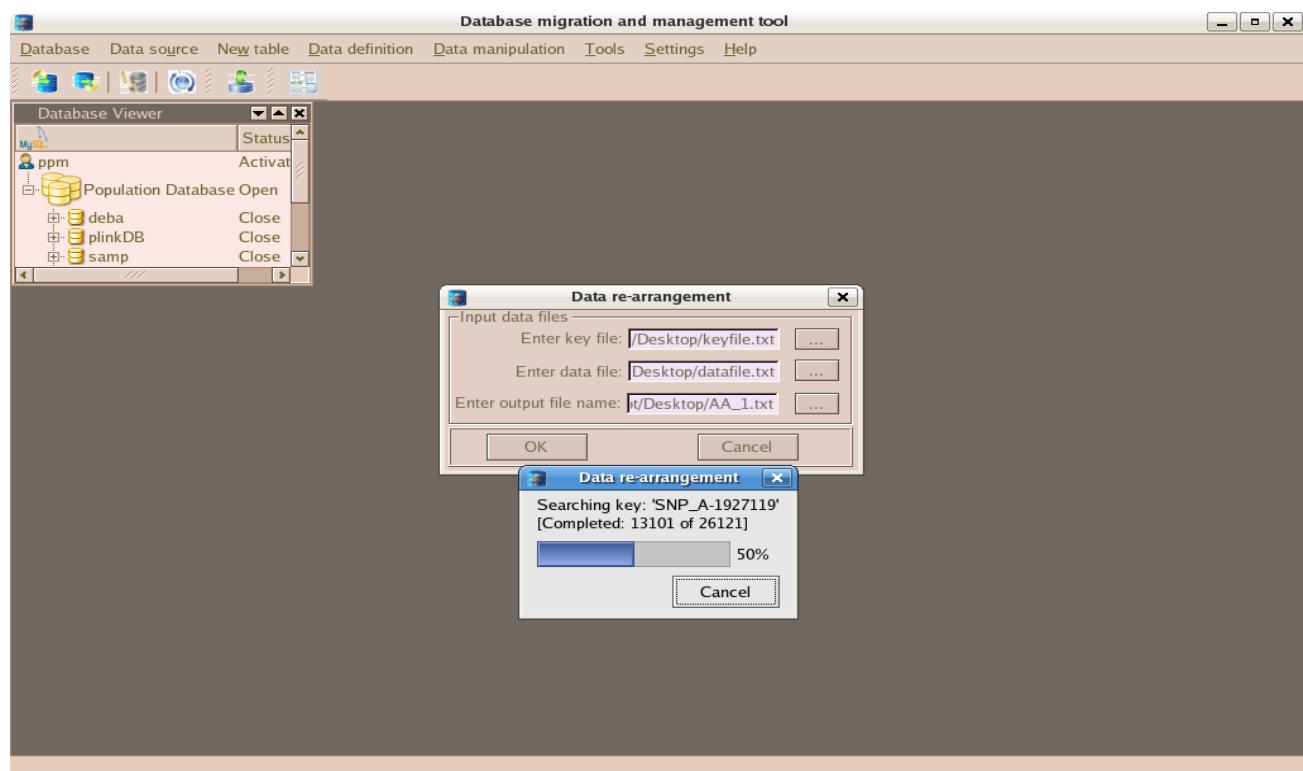
ProbeSetID	PCG100_v2_15_CallCodes	PCG51_v2_15_CallCodes	PCG56_v2_15_CallCodes	PCG61_v2_15_CallCodes	PCG77_v2_15_CallCodes	PC
SNP_A-8429754	AB	BB	BB	AB	AB	AB
SNP_A-8287118	BB	BB	BB	BB	BB	BB
SNP_A-8510258	BB	BB	BB	BB	NoCall	BB
SNP_A-8564242	BB	BB	BB	BB	BB	BB
SNP_A-8539687	AA	AA	AA	AB	AA	AA
SNP_A-8405484	AA	AB	AA	AB	AA	AA
SNP_A-2132755	AA	AB	BB	AB	AA	AB
SNP_A-8647290	AA	BB	BB	AB	AA	AB
SNP_A-8566349	BB	BB	BB	BB	BB	BB
SNP_A-2186168	AA	AA	AA	AA	AA	AA
SNP_A-8522990	BB	BB	BB	BB	BB	BB
SNP_A-8653362	BB	BB	BB	BB	BB	BB
SNP_A-8433169	BB	BB	BB	BB	BB	BB
SNP_A-8702287	NoCall	AB	BB	BB	BB	BB
SNP_A-2231591	AA	AB	AB	AA	AA	AA
SNP_A-8504435	AA	AA	AA	AA	AA	AA
ICMD A 00000000	AA	AA	AA	AA	AA	AA

### data file

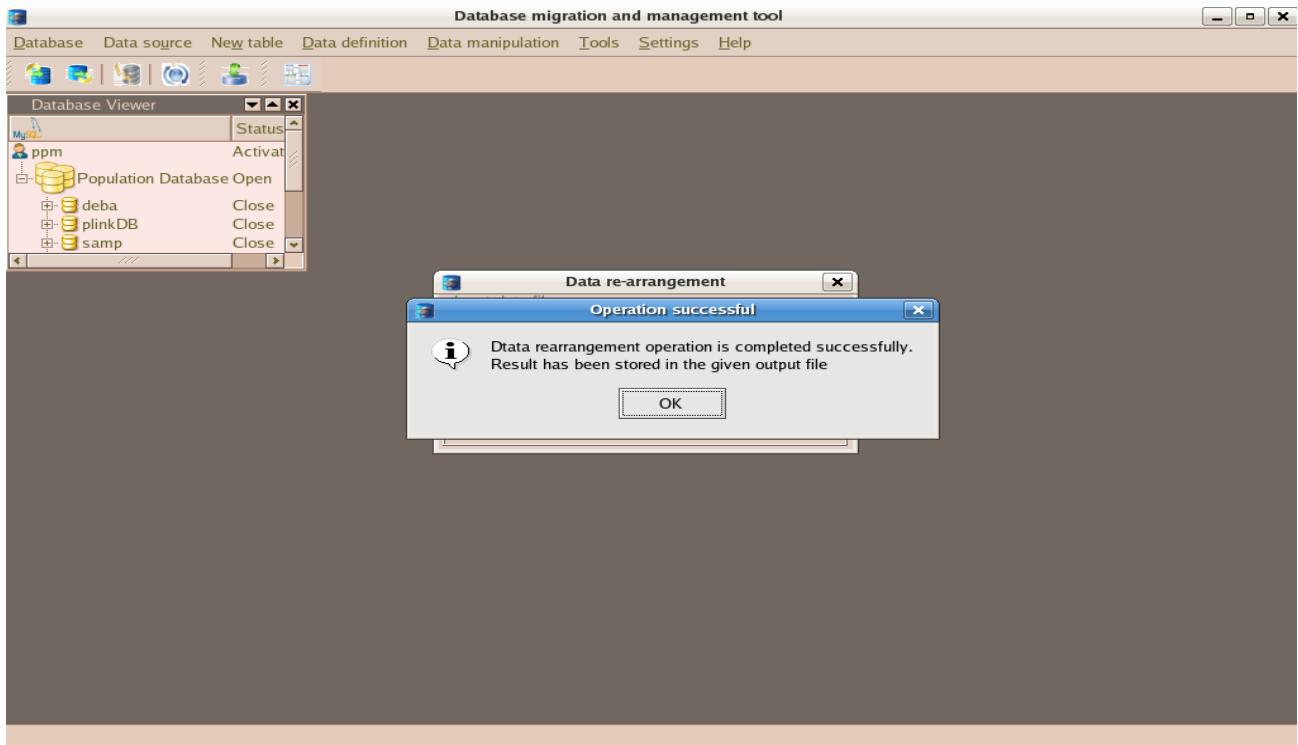
You can arrange rows in the data file with respect to 'ProbeSetID' values, in the order of keys(SNPID) in the key file from this 'Tools -> Data re-arrangement' menu bar option. When this link is followed, a dialog is prompted asking user to give key file and data file as input and also a output file name and location as shown in the figure 3.2.1.6.B.1 below. If you click 'OK', data re-arrangement operation will be started and its status will be as shown in the figure 3.2.1.6.B.2 below. And successful completion of this operation will be as shown in the figure 3.2.1.6.B.3 below.



**Figure 3.2.1.6.B.1: Data re-arrangement dialog**

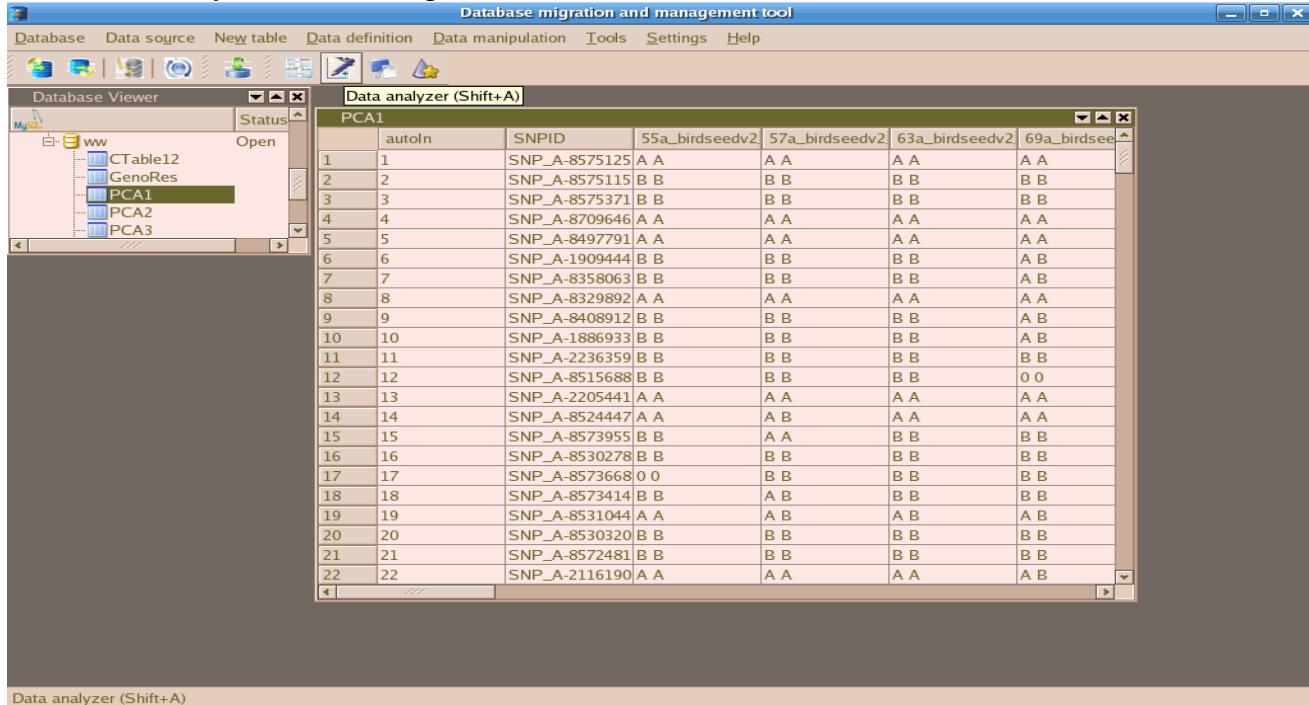


**Figure 3.2.1.6.B.2: Data re-arrangement operation in progress**



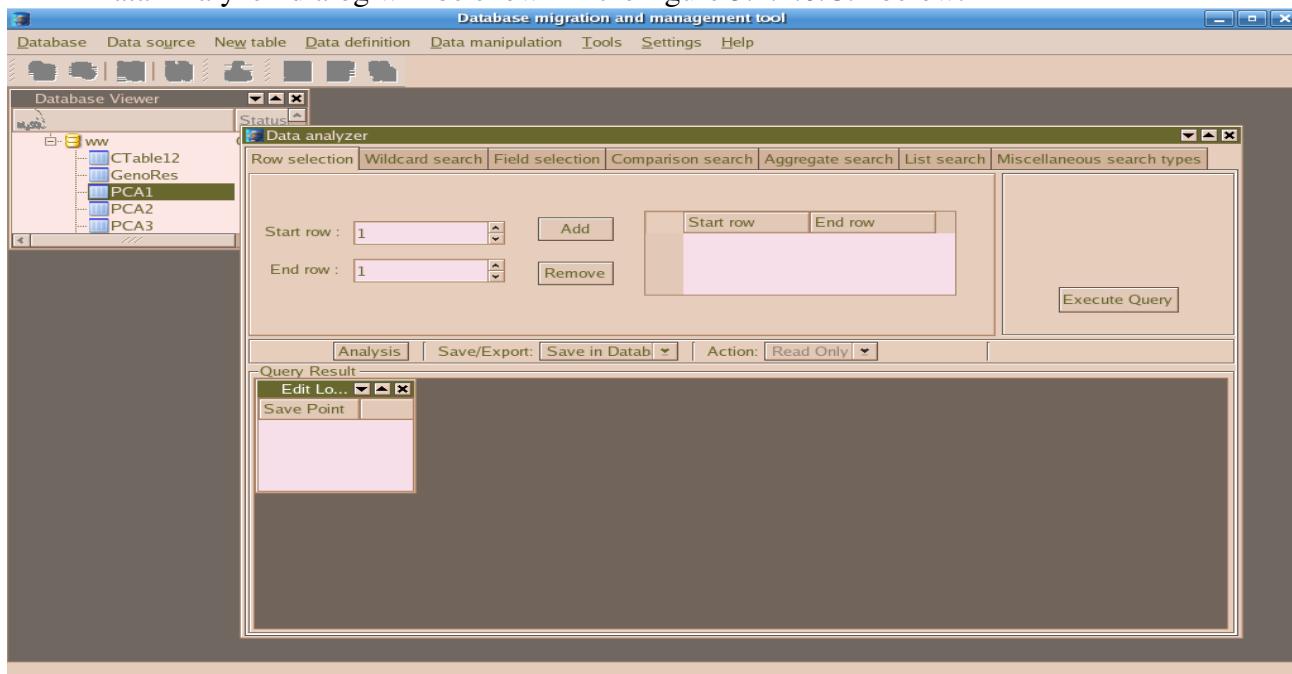
**Figure 3.2.1.6.B.3: Successful completion of Data re-arrangement operation**

- **Data Analyzer:** Left click once on a table icon to select a table or click twice to open it from any database. The table 'PCA1' from database 'ww' is selected in the given example. Then, click the button 'Data analyzer' as shown in the figure 3.2.1.6.C.1 below. Otherwise follow 'Tools -> Data analyzer' menu bar option.



**Figure 3.2.1.6.C.1: Data Analyzer(Yet to open the dialog)**

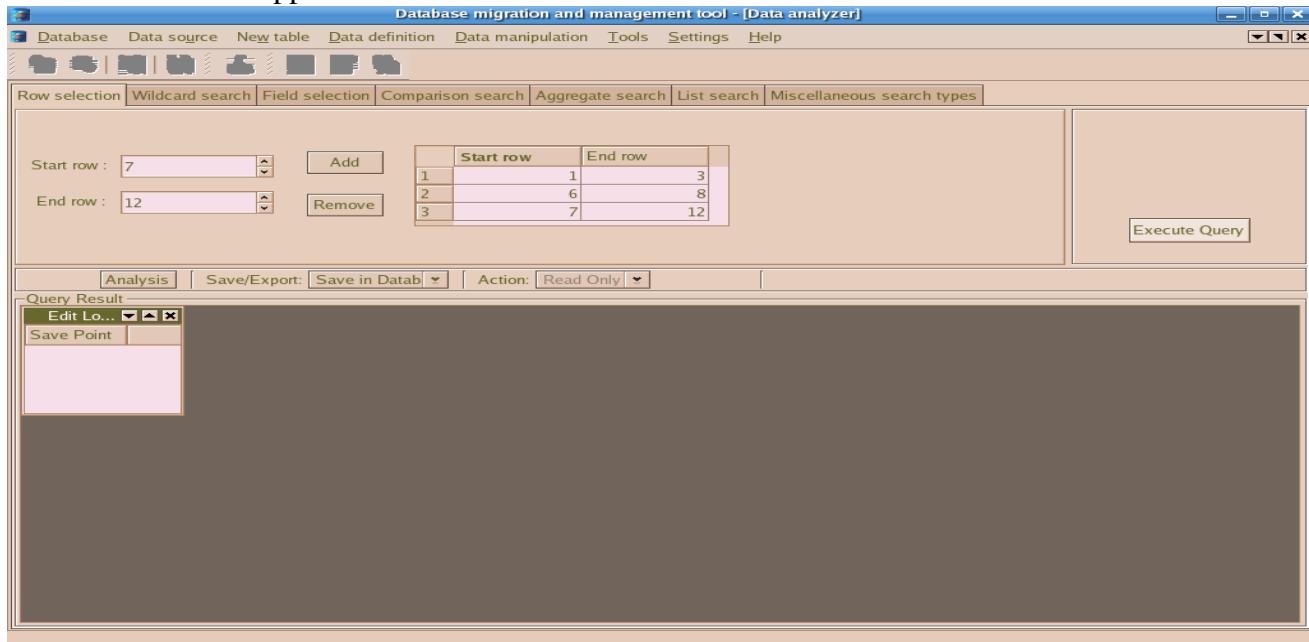
'Data Analyzer' dialog will be shown in the figure 3.2.1.6.C.2 below.



**Figure 3.2.1.6.C.2: Data Analyzer(the dialog is open)**

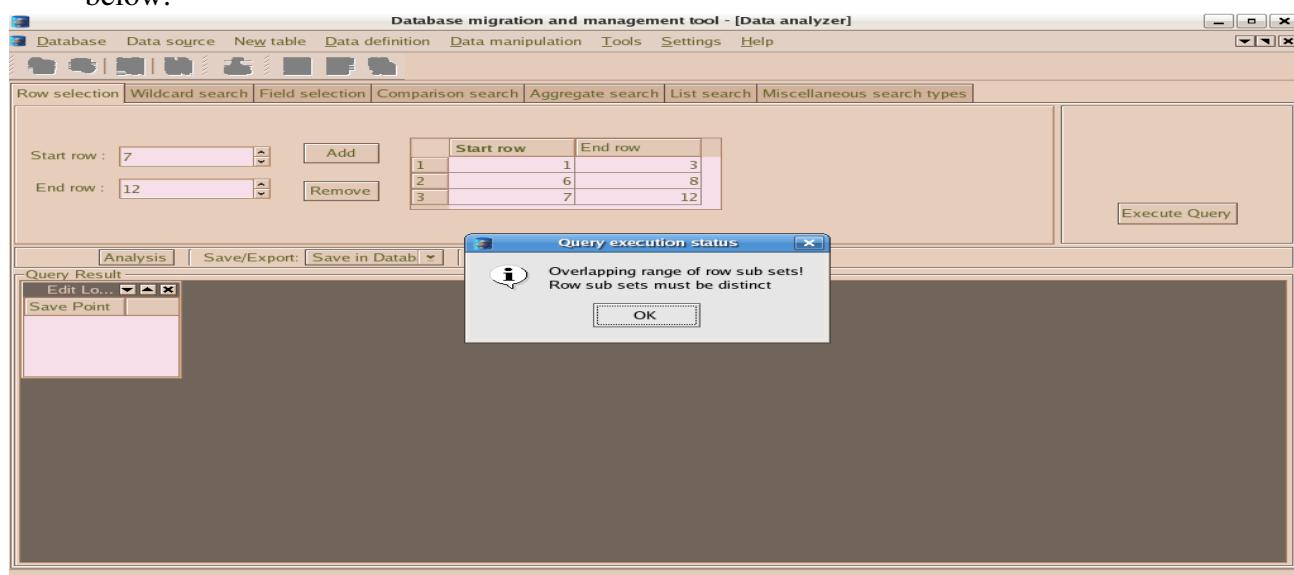
Here, you can select a subset of a table data by query searching. There are four types of searching categories, (a) Row selection, (b) Wild card search, (c) Field selection, (d) Comparison search, (e) Aggregate search and (f) List search.

**(a) Row selection:** As shown in the figure 3.2.1.6.C.3 below, three sets of rows are selected(give 'start row' and 'end row' value and press the 'Add' button). Among them last two sets are overlapped.



**Figure 3.2.1.6.C.3: Data Analyzer[Row selection]**

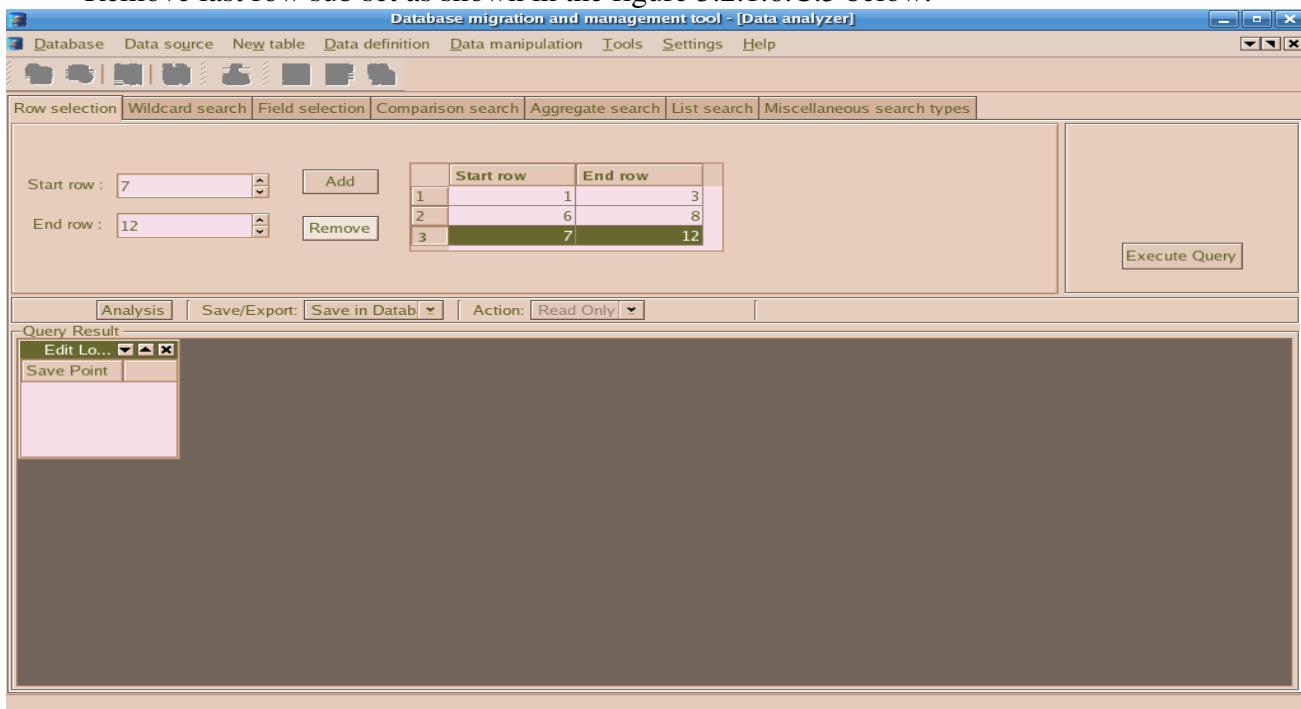
If 'Execute Query' button is clicked a error message will be shown as in figure 3.2.1.6.C.4 below.



**Figure 3.2.1.6.C.4: Data Analyzer[Row selection, row sub set overlap]**

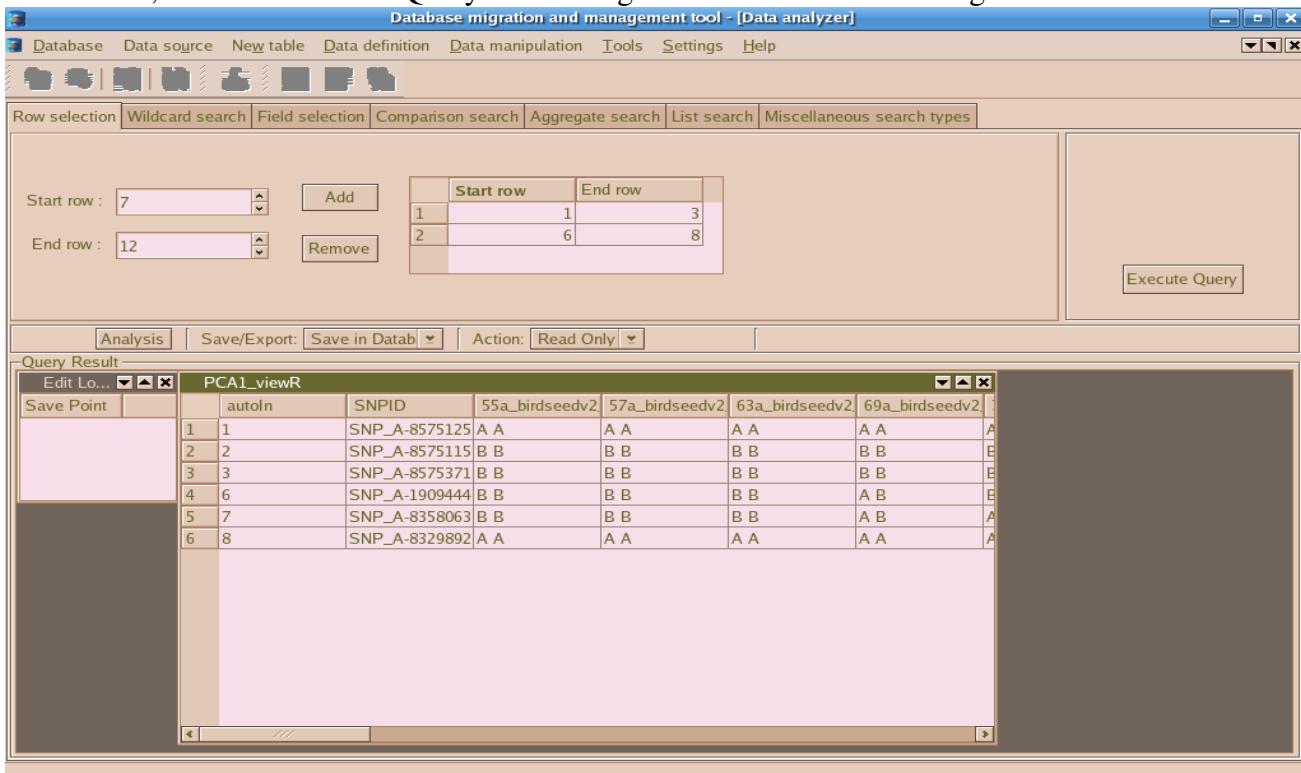
Among selected sub sets of rows, last two being overlapped(6-8,7-12) this problem arise.

Remove last row sub set as shown in the figure 3.2.1.6.C.5 below.



**Figure 3.2.1.6.C.5: Data Analyzer[Row selection, removing last row sub set]**

Then, click the 'Execute Query' button to get result as shown in the figure 3.2.1.6.C.6 below.



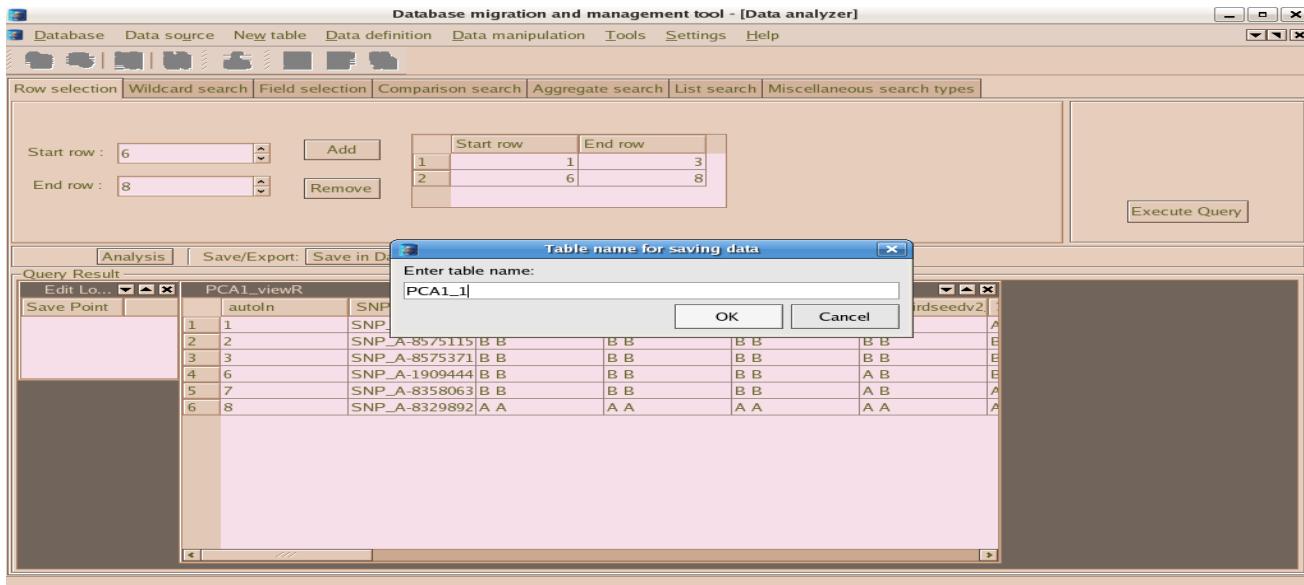
**Figure 3.2.1.6.C.6: Data Analyzer[Row selection, query result]**

Following set of actions can be taken on this result data set.

i) **Analysis:** This part is well described in the next search option 'Wild card search'

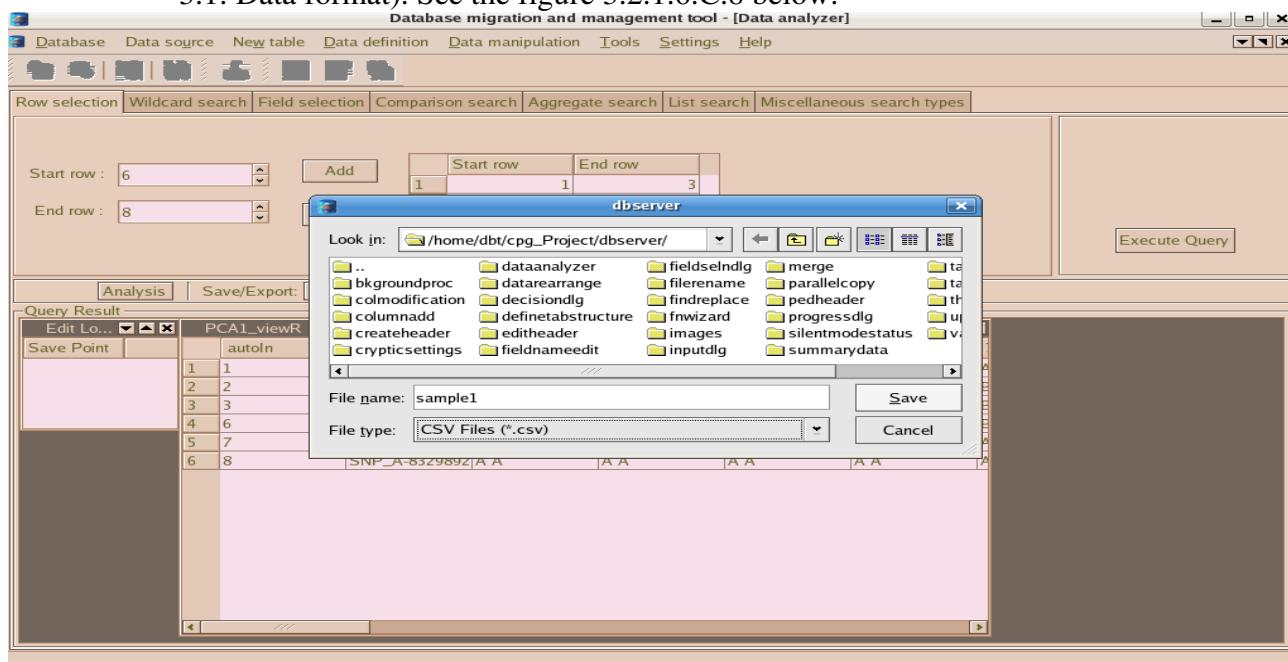
ii) **Save/Export:**

- **Save in Database:** Select this option. A dialog box as shown in the figure 3.2.1.6.C.7 will be prompted asking for a table name. Give a single word name and click the 'OK' button.



**Figure 3.2.1.6.C.7: Data Analyzer[Row selection, Save in the database]**

- **Export to Disk:** Asks user to save the table into the disk in various formats(See section 3.1: Data format). See the figure 3.2.1.6.C.8 below.



**Figure 3.2.1.6.C.8: Data Analyzer[Row selection, Export to Disk]**

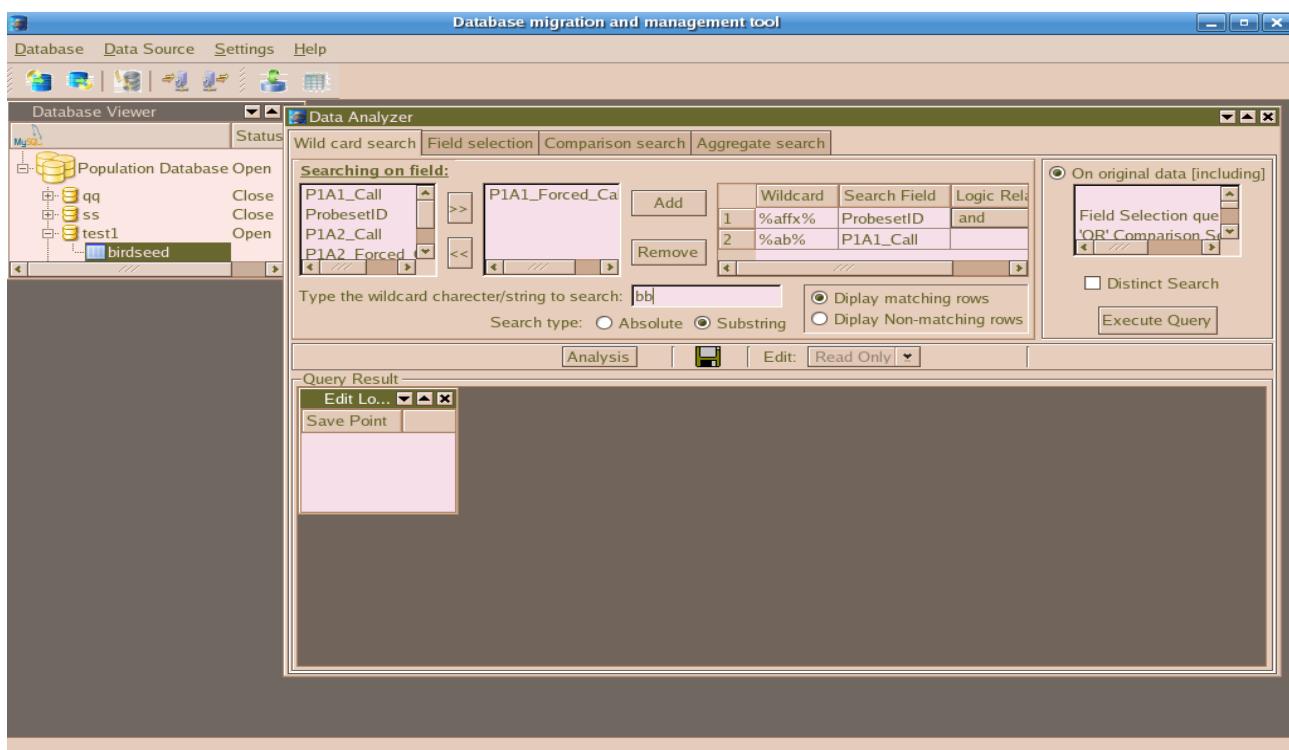
- **Export to PLINK:** Allow user to export data in PLINK format. You must have knowledge about PLINK's '.map' and '.ped' files and their formats. Suppose, you have map and ped data in the database. You take subset of that data. Then, you want to export it to the PLINK format. That is in '.map' format for map data file and '.ped' format for ped data file. Then use this option.

iii) **Action:** This part is well described in the next search option 'Wild card search'

**(b) Wild card search:** Here you can create sub data set of original table data set or on the sub data set created under section listed under caption 'On result of', by searching for one or more string/s or substring/s in one or more field/s as well as integrating search queries from other searching categories also. Follow the steps below:

#### a.1) Create a search token: [obligatory steps]

- Select one or more fields from the list box on the left side of the right arrow("=>") button (see figure below) and move them in the right list box by clicking the right arrow("=>") button. Left arrow button to move fields back to left list box from right list box.
- Type string to search in the specified text box. This search is case insensitive.
- Select search type absolute(search only for the string given)/substring(search for a string which contains the given string).
- Click "add" button to add the search token in the table.



**Figure 3.2.1.6.C.9: Data Analyzer(Wild card search)**

Thus you can create more search tokens and relate them using and/or logical relation as per your requirement.

#### b.1) Remove a search token: [optional]

Select the row and click the “Remove” button.

#### c.1) Import other search criteria: [optional]

Look at the top right box in the figure below.

By default 'On original data [including]' radio button is selected. Which indicates that your search query is executed on original data stored the selected database table. In the list box below you will find options for importing search query of other categories.

'On result of' radio option lists link to the sub data set/s obtained by executing queries on categories preceding this category.

#### d.1) Change display matching/non matching row option. [optional]

#### e.1) Choose “distinct search” option to avoid duplicate row satisfying the search criteria.

[optional]

**f.1)** Click on the button “Execute Query” and see search result as shown in the figure 3.2.1.6.C.10 below.

The screenshot shows the 'Database migration and management tool - [Data analyzer]' window. The menu bar includes Database, Data source, New table, Data definition, Data manipulation, Tools, Settings, and Help. The toolbar has icons for file operations like Open, Save, Print, etc. The main interface has tabs: Row selection, Wildcard search, Field selection, Comparison search, Aggregate search, List search, and Miscellaneous search types. The 'Wildcard search' tab is active. It displays a search panel with a list of search terms (e.g., 57a\_birdseedv2\_1\_C, 63a\_birdseedv2\_1\_C, 69a\_birdseedv2\_1\_C, 71a\_birdseedv2\_1\_C), a search input field, and buttons for Add, Remove, and a logic relation table. The logic relation table shows two rows: 1. Wildcard %affx% Search Field SNPID Logic Relation and, 2. Wildcard %a b% Search Field 55a\_birdseedv2\_1\_Call Logic Relation. A radio button group on the right shows 'On original data [including]' selected. Below the search panel is a table titled 'Query Result' with columns: Save Point, PCA1\_viewW, autoln, SNPID, 55a\_birdseedv2, 57a\_birdseedv2, 63a\_birdseedv2, 69a\_birdseedv2. The table contains 14 rows of data. At the bottom are buttons for Analysis, Save/Export, Action (Read Only), and an Execute Query button.

Save Point	PCA1_viewW	autoln	SNPID	55a_birdseedv2	57a_birdseedv2	63a_birdseedv2	69a_birdseedv2
	1	666	AFFX-SNP_119	A B	B B	A B	A B
	2	1141	AFFX-SNP_686	A B	A A	A A	A A
	3	3598	AFFX-SNP_115	A B	B B	A B	A A
	4	3602	AFFX-SNP_574	A B	A A	A B	A B
	5	3910	AFFX-SNP_114	A B	A B	A B	A A
	6	5430	AFFX-SNP_625	A B	B B	A A	A A
	7	6059	AFFX-SNP_970	A B	A A	A A	A B
	8	7144	AFFX-SNP_948	A B	A B	A B	A A
	9	8298	AFFX-SNP_300	A B	A B	A B	A A
	10	8793	AFFX-SNP_100	A B	A A	A A	0 0
	11	8801	AFFX-SNP_624	A B	B B	B B	B B
	12	9594	AFFX-SNP_806	A B	A A	A B	A A
	13	10317	AFFX-SNP_373	A B	A B	A B	B B
	14	10367	AFFX-SNP_941	A B	B B	B B	A B

**Figure 3.2.1.6.C.11: Data Analyzer(Wild card search)**

- ◆ What operations can be performed on this result data? [CAUTION: following features are not allowed for all possible types of search criteria].

#### a.1) You can perform standard analysis on this data:

Click on the “Analysis” button to bring the dialog “Summary Data”(see figure 3.2.1.6.C.12 below).

##### i) Individual Wise:

**Genotype count:** Tick the “Genotype Count” tick box. Then click on “Generate” button to start the operation.

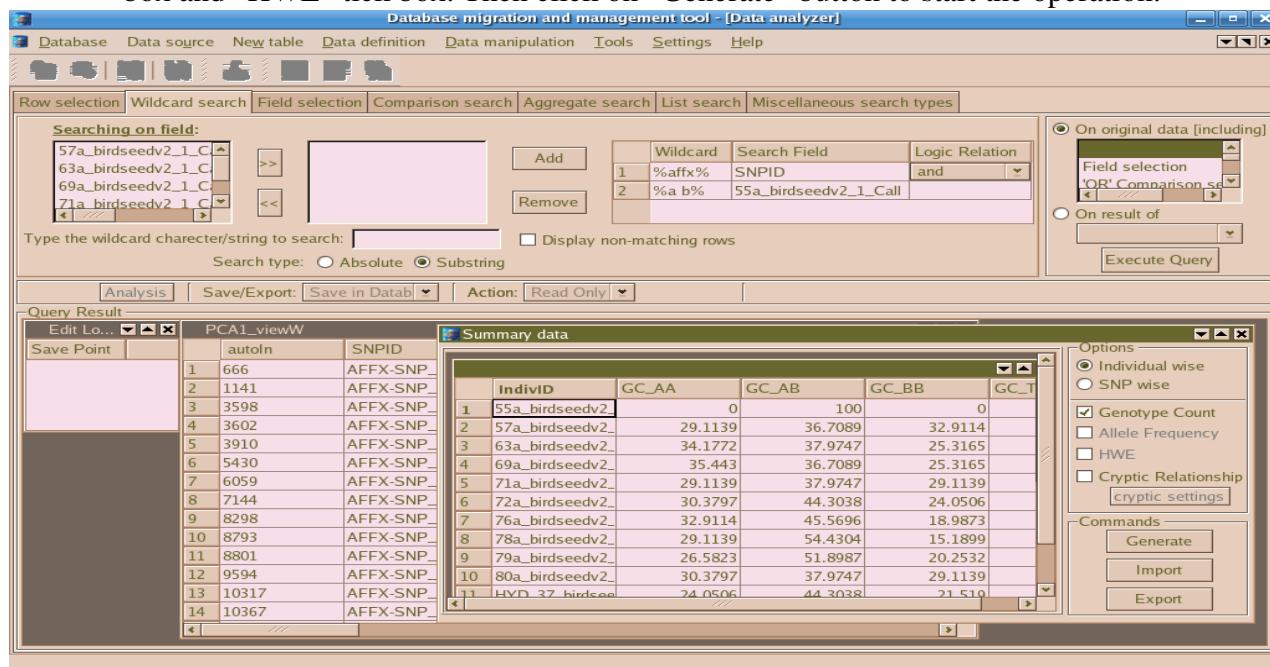
**Cryptic relationship:** Tick the “Cryptic Relationship” tick box. Click the “cryptic settings” button and give the “threshold value” and all the “Undefined Genotype” values (Example NoCall or 0 0 etc, use “add” button to add multiple values in the table given, to remove a value select the row from the table and click the “Remove” button) exist in the table data on which you are going to find out “Cryptic Relationship”. Then click on “Generate” button to start the operation. Consider only the upper triangle for result data shown as square matrix form in the table.

##### ii) SNP Wise:

**Genotype count:** Tick the “Genotype Count” tick box. Then click on “Generate” button to start the operation.

**Allele Frequency:** Tick both, the “Genotype Count” tick box and the “Allele Frequency” tick box. Then click on “Generate” button to start the operation.

**HWE calculation:** Tick the “Genotype Count” tick box, “Allele Frequency” tick box and “HWE” tick box. Then click on “Generate” button to start the operation.



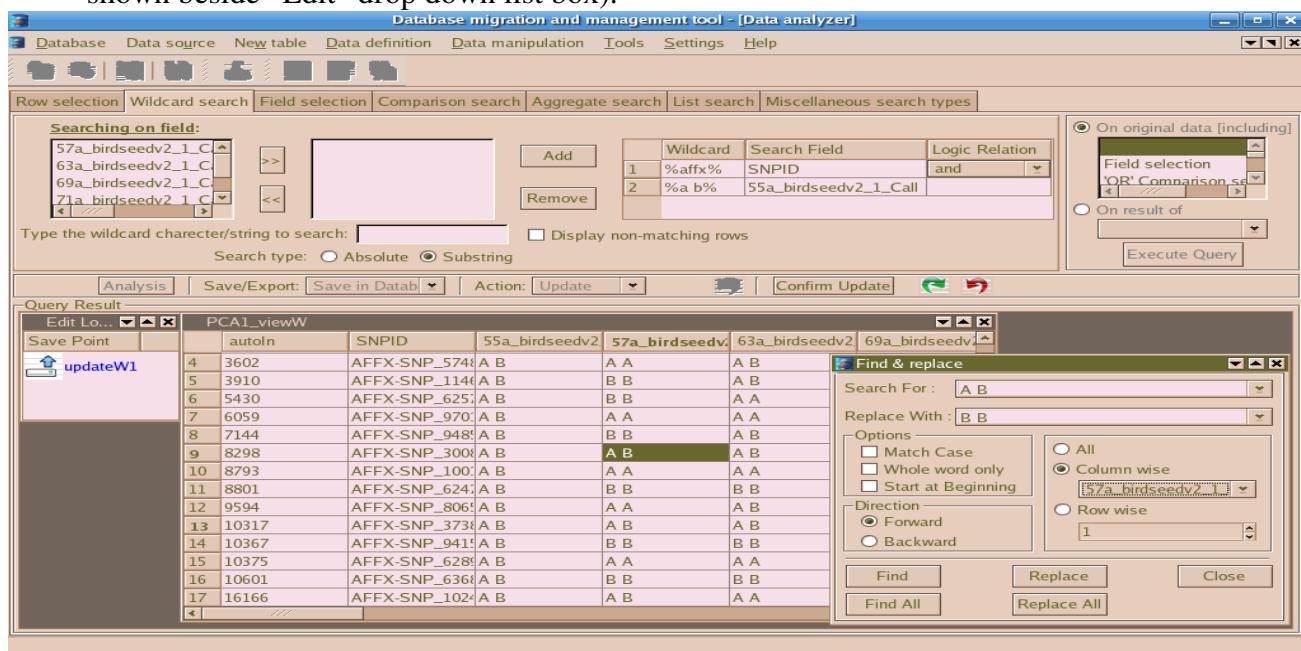
**Figure 3.2.1.6.C.13: Data Analyzer(Wild card search) Summary Data**

To import the generated data in the database click the “Import” button.

To save the generated data in your computer click the “Export” button.

**b.1) Save table data in various formats:** See chapter 3(section no 3.1), Data format, output data format section.

**c.1) Update Operation (Find & Replace table values):** Select “Update” option from the edit drop down list box. A “Find&Replace” button will be shown. If you click on this button a standard search & replace dialog will appear as shown in the figure below. Here, you can perform search & replace operation on table data with undo (red arrow) redo (green arrow) facilities. When you close this dialog, current changes will be permanent for these set of update operations and a update status will be shown in the “Edit Log” list box under “Save Point” column. You can undo/redo this update operation as a single event (undo/redo buttons will be shown beside “Edit” drop down list box).



**Figure 3.2.1.6.C.14: Data Analyzer(Wild card search) Find & Replace**

**d.1) Delete Operation (Delete table rows):** Select “Delete” option from the edit drop down list box to delete data obtained by query from original table. You can undo/redo this delete operation as a single event (undo/redo buttons will be shown beside “Edit” drop down list box).

**[Important:** When “Data Analyzer” dialog is closed, these edit operations on the database table data will be saved permanently at the state of the time of closing the dialog.]

**(c) Field selection:** If you want to filter data from some selected fields use this section. Also you can import search queries from other searching categories. Follow the steps below:

**b.1) Create a search token:** [obligatory step]

- Select one or more fields from the list box on the left side of the right arrow("=>") button (see figure below) and move them in the right list box by clicking the right arrow("=>") button. Left arrow button to move fields back to left list box from right list box.
- Tick "Select all fields" check box to fetch data from all fields. [do either step i or ii]
- Choose "distinct search" option to avoid duplicate row satisfying the search criteria. [optional]

**b.2) Import other search criteria:** [optional]

Look at the top right box in the above figure which indicates that your search query can be run on original data or on result data set from other section. In the list box there you will find options for importing search query of other categories. Using "On result of" drop down list box you can select result data set from other section.

- c.2) Click on the button "Execute Query" and see search result as shown in the figure 3.2.1.6.C.15 below.**

The screenshot shows the 'Database migration and management tool - [Data analyzer]' window. The menu bar includes Database, Data source, New table, Data definition, Data manipulation, Tools, Settings, and Help. The toolbar has icons for file operations like Open, Save, Print, and Database. The main interface has tabs: Row selection, Wildcard search, Field selection, Comparison search, Aggregate search, List search, and Miscellaneous search types. The 'Field selection' tab is active, showing a list of fields to move to the right panel. A 'Select fields to move in the right panel:' list contains '80a\_birdseedv2\_1\_Call', 'HYD\_37\_birdseedv2\_1\_Call', 'HYD\_39\_birdseedv2\_1\_Call', 'HYD\_40\_140808\_birdseedv2\_1\_Call', 'HYD\_47\_birdseedv2\_1\_Call', and 'HYD\_49\_140808\_birdseedv2\_1\_Call'. To its right are two arrows: '>>' and '<<'. Below these are two checkboxes: 'Select all fields' and 'On original data [including]'. The 'On original data [including]' checkbox is checked, and it lists 'Wildcard search', 'OR Comparison Search', and 'On result of' with a dropdown menu showing 'Wildcard' and a 'Execute Query' button. Below this is a 'Query Result' section titled 'PCA1\_viewF' containing a table with 14 rows and 6 columns. The columns are labeled 'Save Point', 'autoln', 'SNPID', '55a\_birdseedv2', '57a\_birdseedv2', '63a\_birdseedv2', and '69a\_birdseedv2'. The data rows show various SNP IDs and alleles (A/A, B/B, etc.).

**Figure 3.2.1.6.C.15: Data Analyzer(Field selection)**

- ◆ **What operations can be performed on this result data?** [CAUTION: following features are not allowed for all possible types of search criteria].
- Same as "Wild card search". See page 13-15.

**(d) Comparison search:** If you want to filter data based on conditional search on numeric fields use this section. Also you can import search queries from other searching categories also. Follow the steps below:

**a.3) Create a search token:** [obligatory step]

- i) Select one numeric field from the drop down list box (see figure 3.2.1.6.C.16).
- ii) Select comparison operator and type value beside the text box. There are two drop down list box available for specifying upper and lower boundary, second one is optional. If you need to specify both then also specify logical “AND” or “OR” operator to relate them.
- iii) Using “Add” button add the search token in the table.

**b.3) Remove a search token:** [optional]

Select the row and click the “Remove” button.

**c.3) Import other search criteria:** [optional]

Look at the top right box in the above figure which indicates that you search query can be run on original data or on result data set from other section. In the list box there you will find options for importing search query of other categories. Using “On result of” drop down list box you can select result data set from other section.

- d.3) Choose “distinct search” option to avoid duplicate row satisfying the search criteria.**  
[optional]
- e.3) Click on the button “Execute Query” and see search result as shown in the figure 3.2.1.6.C.17 below.**

	autoln	SNPID	55a_birdseedv2	57a_birdseedv2	63a_birdseedv2	69a_birdseed
1	346	SNP_A-8669509	0 0	B B	0 0	B B
2	347	SNP_A-4265735	A B	A B	A B	A B
3	348	SNP_A-2303693	B B	B B	B B	B B
4	349	SNP_A-2159748	A A	A A	A A	A A
5	350	SNP_A-8580312	B B	B B	B B	B B
6	351	SNP_A-2309606	A A	A A	A A	A A
7	352	SNP_A-8290898	A B	B B	B B	A B
8	353	SNP_A-1909953	B B	B B	B B	B B
9	354	SNP_A-8675963	A B	B B	B B	B B
10	355	SNP_A-8702773	A A	A A	A A	A A
11	356	SNP_A-8669937	0 0	0 0	0 0	0 0
12	357	SNP_A-1910607	A A	A A	A A	A A
13	358	SNP_A-2298997	A A	A B	B B	A B
14	359	SNP_A-1902890	A A	0 0	0 0	0 0

**Figure 3.2.1.6.C.17: Data Analyzer(Comparison search)**

- ◆ **What operations can be performed on this result data?** [CAUTION: following features are not allowed for all possible types of search criteria].  
Same as “Wild card search”. See page 13-15.

**(e) Aggregate search:** If you want to filter data based on aggregate search use this section. By aggregate search you can get group wise count, average, sum values. Also you can import search queries from other searching categories also. Follow the steps below:

**a.4) Create a search token:** [obligatory step]

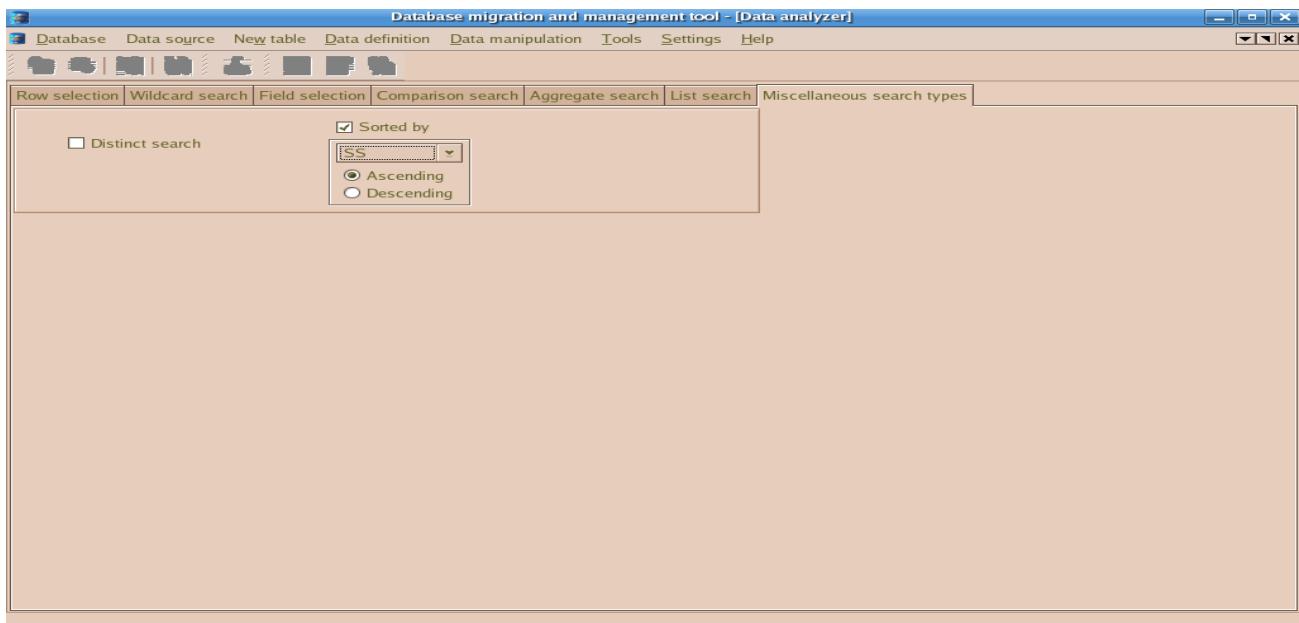
- i) Select count/sum/avg on a field(select from drop down list box beside) and a group by field.
- ii) Add the token using “Add” button. Then you must give a alias name in the indicated field. You can remove a token from table using “Remove” button.
- iii) If you want to specify condition on the group wise result value use the panel named “Comparison”. [optional]
- iv) If you want to get result on sorted order, specify field name on which to apply sorting in ascending/descending order. [optional]
- v) Choose “distinct search” option to avoid duplicate row satisfying the search criteria. [optional]

**b.4) Import other search criteria:** [optional]

Look at the top right box in the above figure which indicates that you search query can be run on original data or on result data set from other section. In the list box there you will find options for importing search query of other categories. Using “On result of” drop down list box you can select result data set from other section.

Here, if you want to get result in sorted order select your choice from 'Miscellaneous search types' caption. See figure 3.2.1.6.C.18 below.

**c.4) Click on the button “Execute Query” and see search result as shown in the figure 3.2.1.6.C.19 below.**



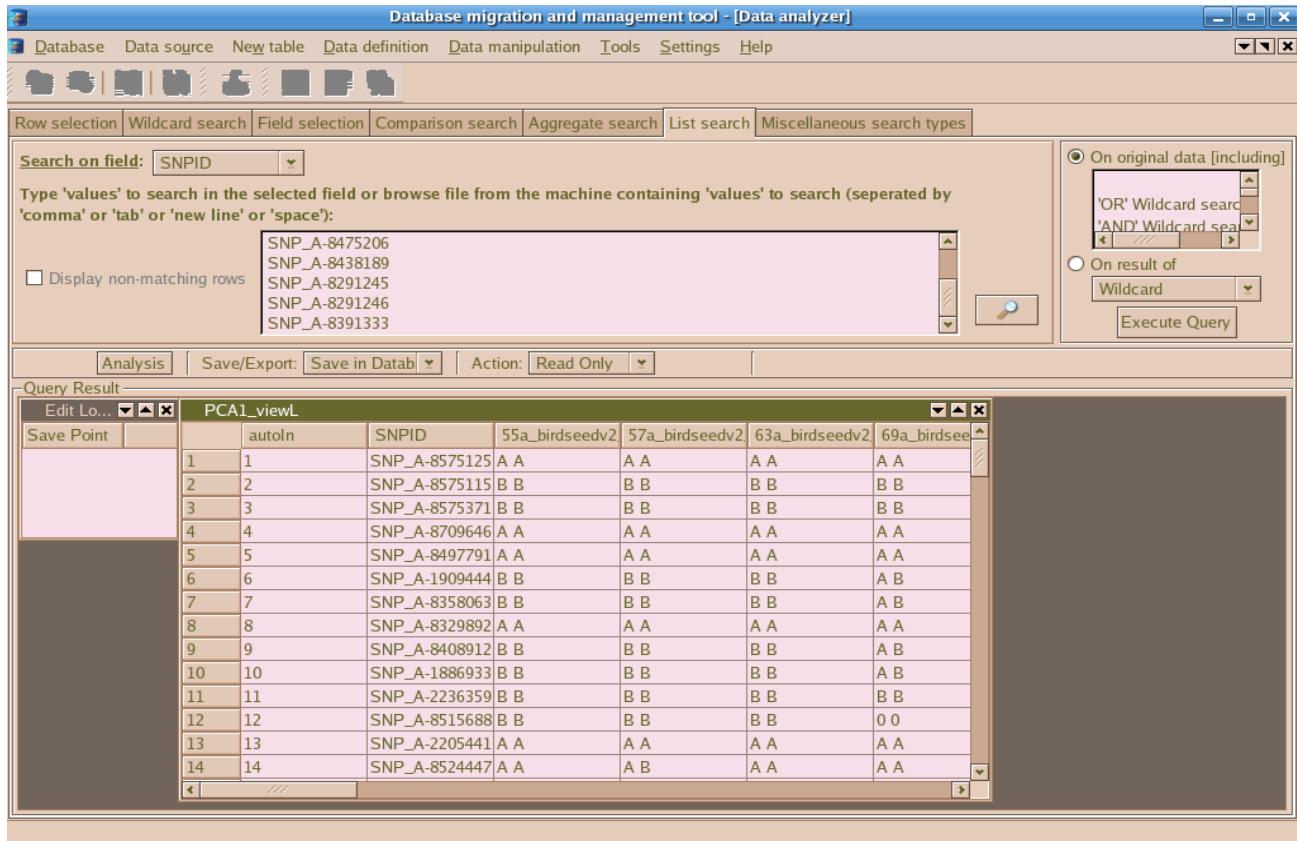
**Figure 3.2.1.6.C.18: Data Analyzer(Aggregate search, sort order selection)**

SNPID	SS	COUNT
0 0	5170	1
A A	24110	2
A B	18851	3
B B	23313	4

**Figure 3.2.1.6.C.19: Data Analyzer(Aggregate search)**

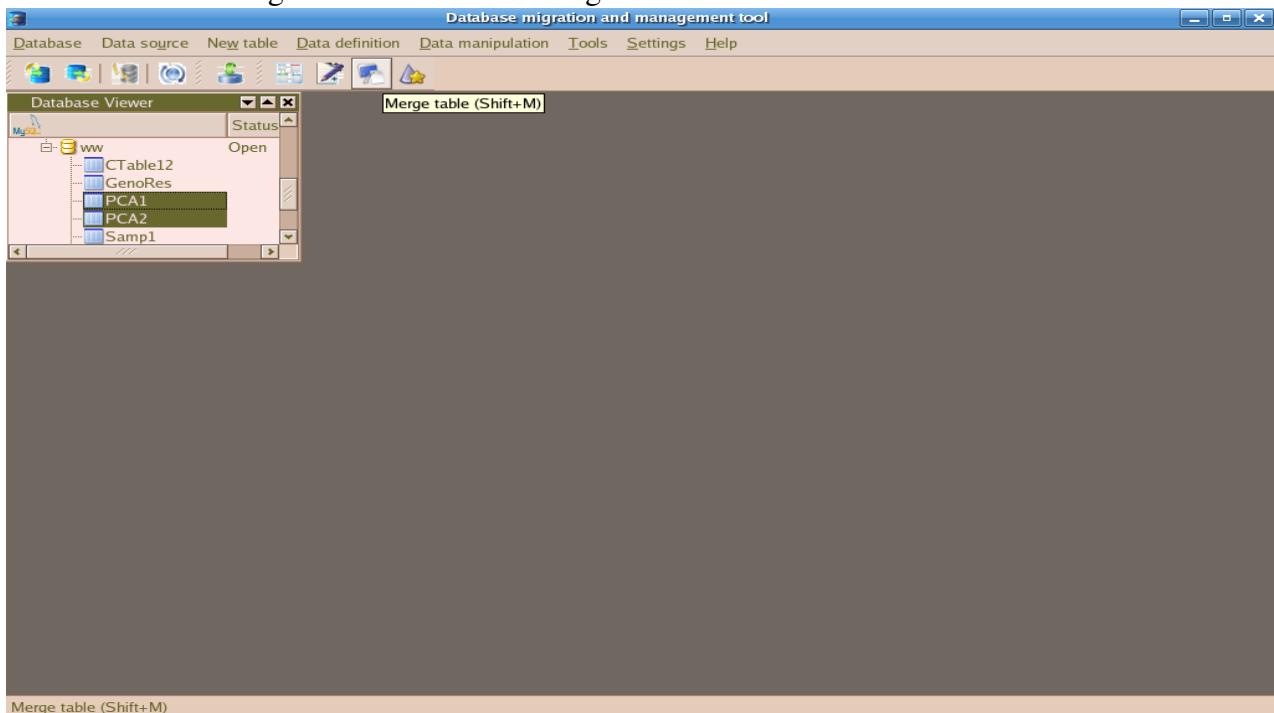
- ◆ **What operations can be performed on this result data?** [CAUTION: following features are not allowed for all possible types of search criteria.].  
Same as “Wild card search”. See page 13-15.

**(f) List search:** If you have a list of key/values based on which you want to fetch data from any database table, use this search criteria. As shown in the figure 3.2.1.6.C.20 below, a list of key values are loaded from disk file. Also, you have to select correct field/column on which key value searching will be done. Then, press 'Execute Query' button to get result.



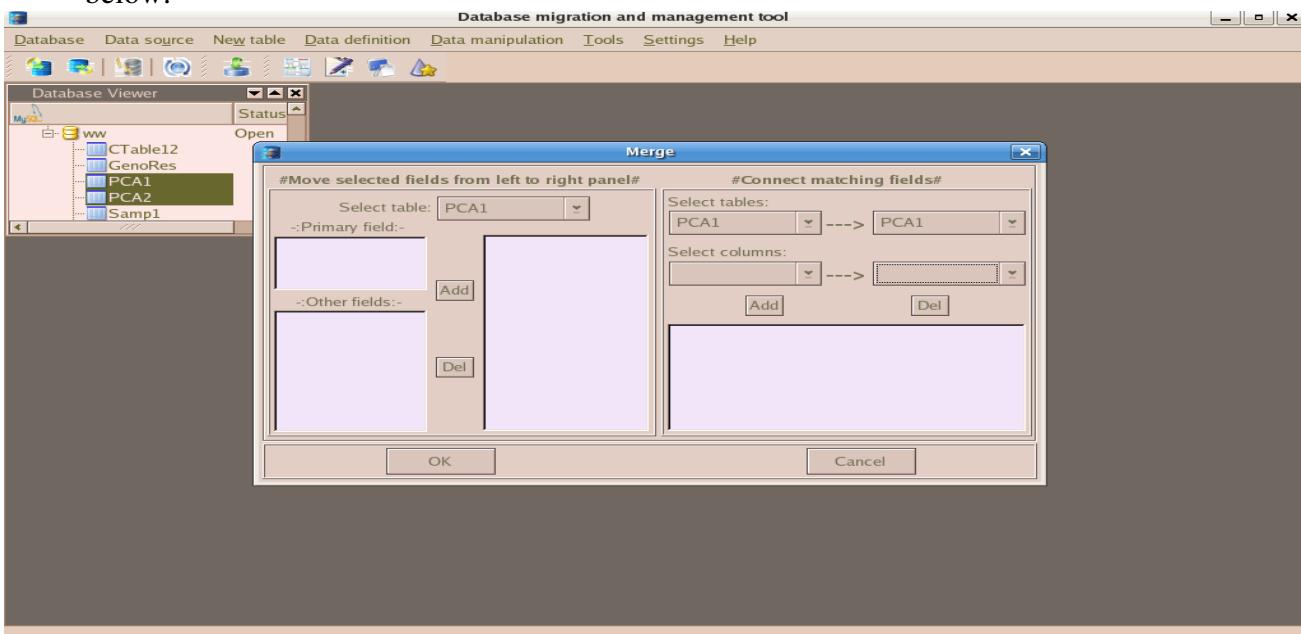
**Figure 3.2.1.6.C.20: Data Analyzer(List search)**

- **Merge table:** Merge data from two or more tables into a single table.
- Step 1:** Select at least two tables from any database where tables contain similar kind of data that can be merged as shown from the figure 3.2.1.6.D.1 below.



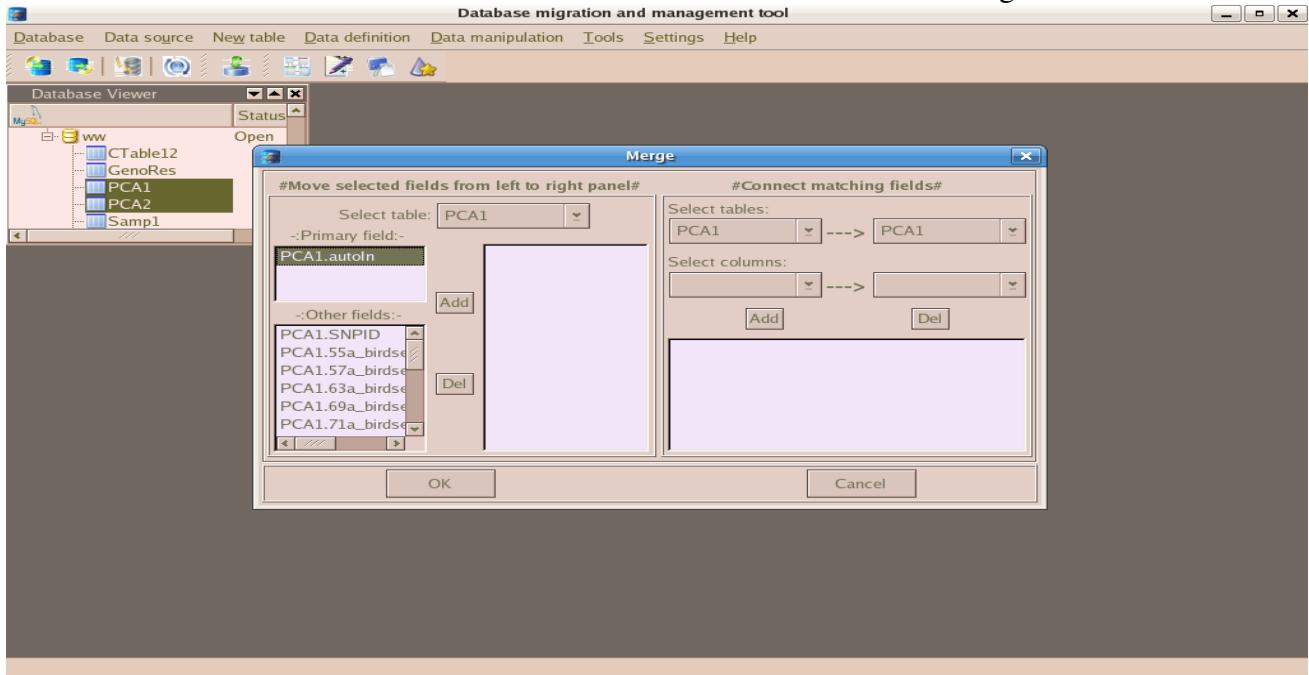
**Figure 3.2.1.6.D.1: Merge table, at least two table selection**

Now, click the 'Merge table' button (highlighted in the above figure) or follow the link Tools -> Merge tables menu bar option. A dialog will be prompted as shown in the figure 3.2.1.6.D.2 below.



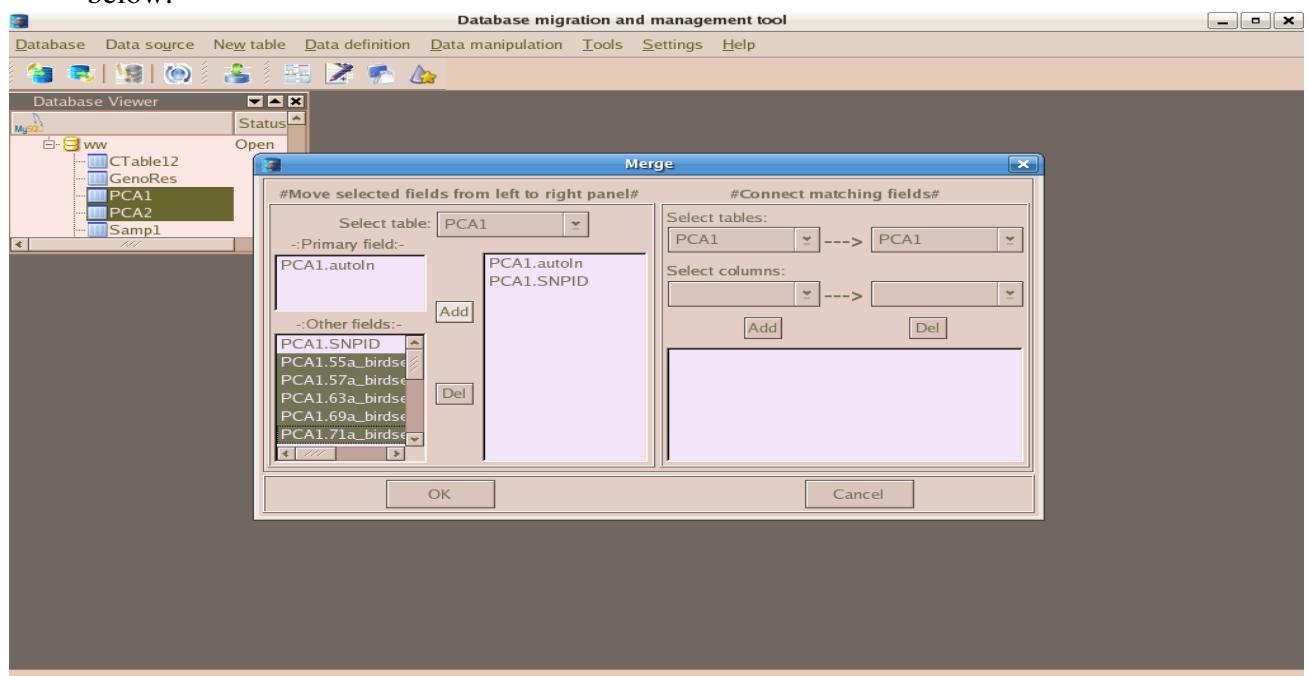
**Figure 3.2.1.6.D.2: Merge table dialog**

**Step 2:** First it is required move selected fields from left to right panel. Select a table from 'Select table' pop up menu. Keys in the the table will be listed under 'Primary field' list box and other fields will be listed under 'Other field' list box. As shown in the figure 3.2.1.6.D.3 below.

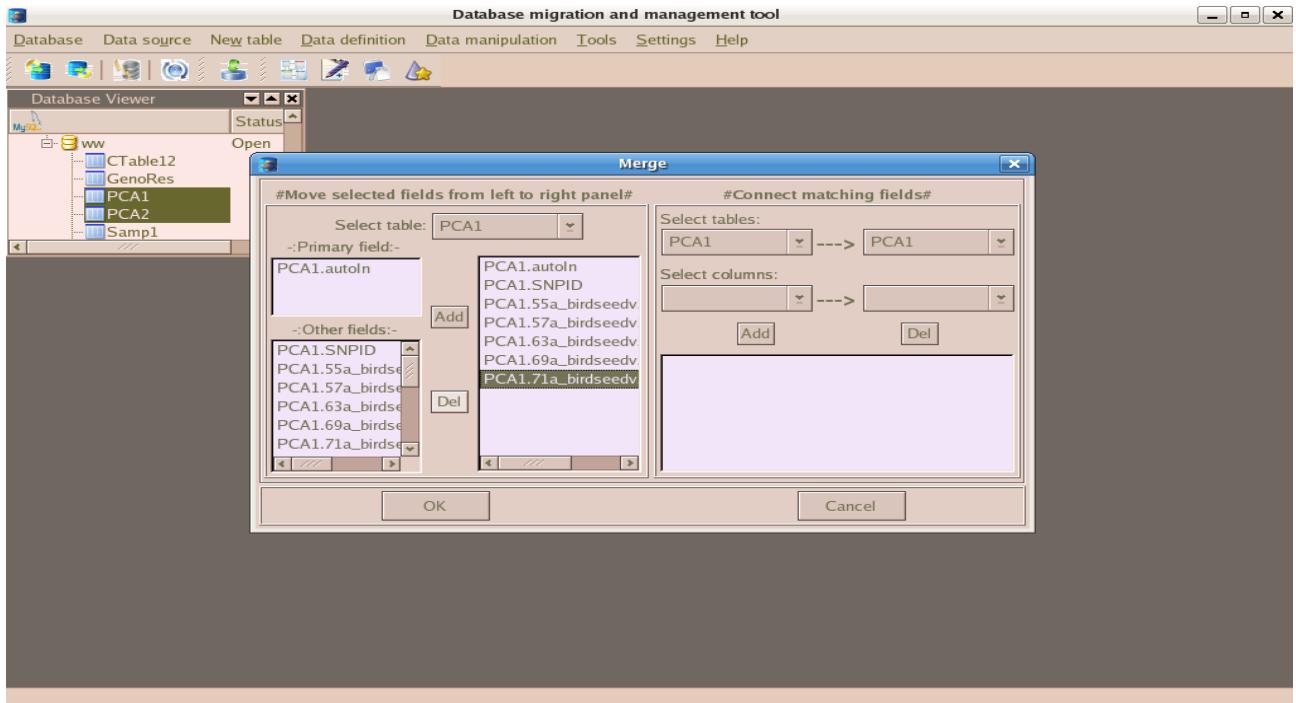


**Figure 3.2.1.6.D.3: Merge table dialog[field/s selection 1]**

In this example, only key field from the table 'PCA1' is selected to move to the right panel. Same way, fields from 'Other fields' list box can be selected. Then click the 'Add' button to move selected fields into the right list box as shown in the figure 3.2.1.6.D.4 & 3.2.1.6.D.5 below.



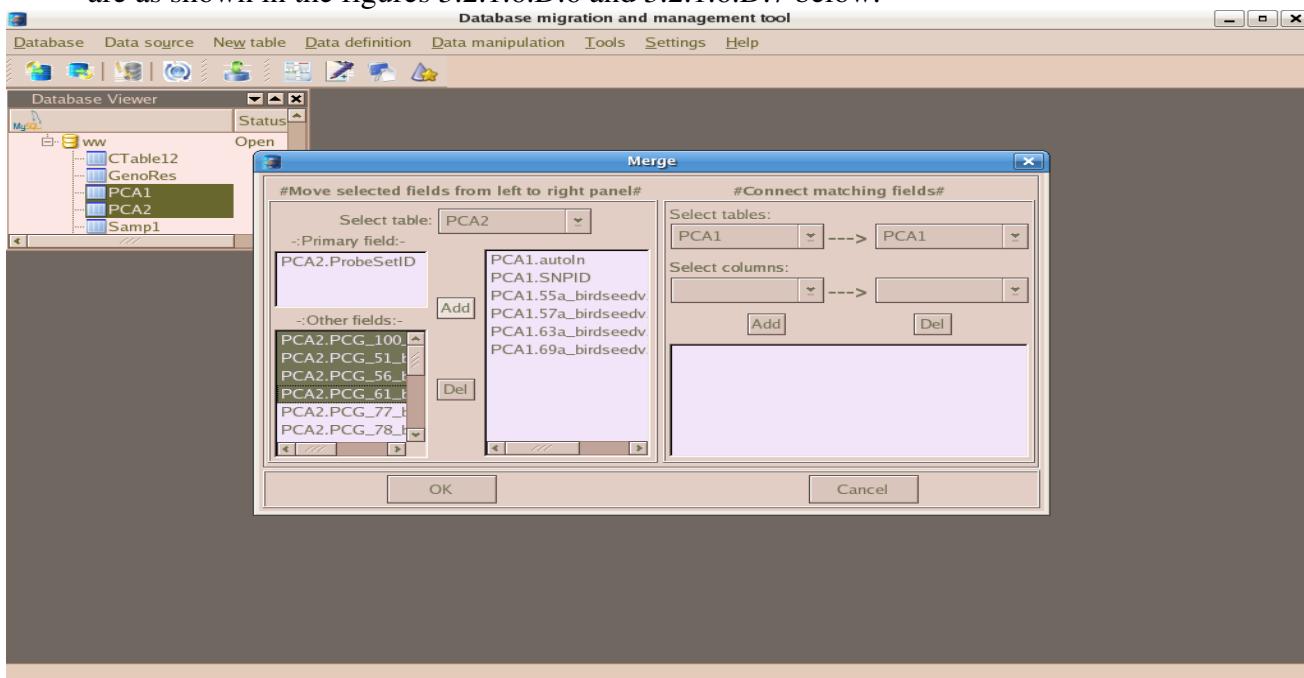
**Figure 3.2.1.6.D.4: Merge table dialog[field/s selection 2]**



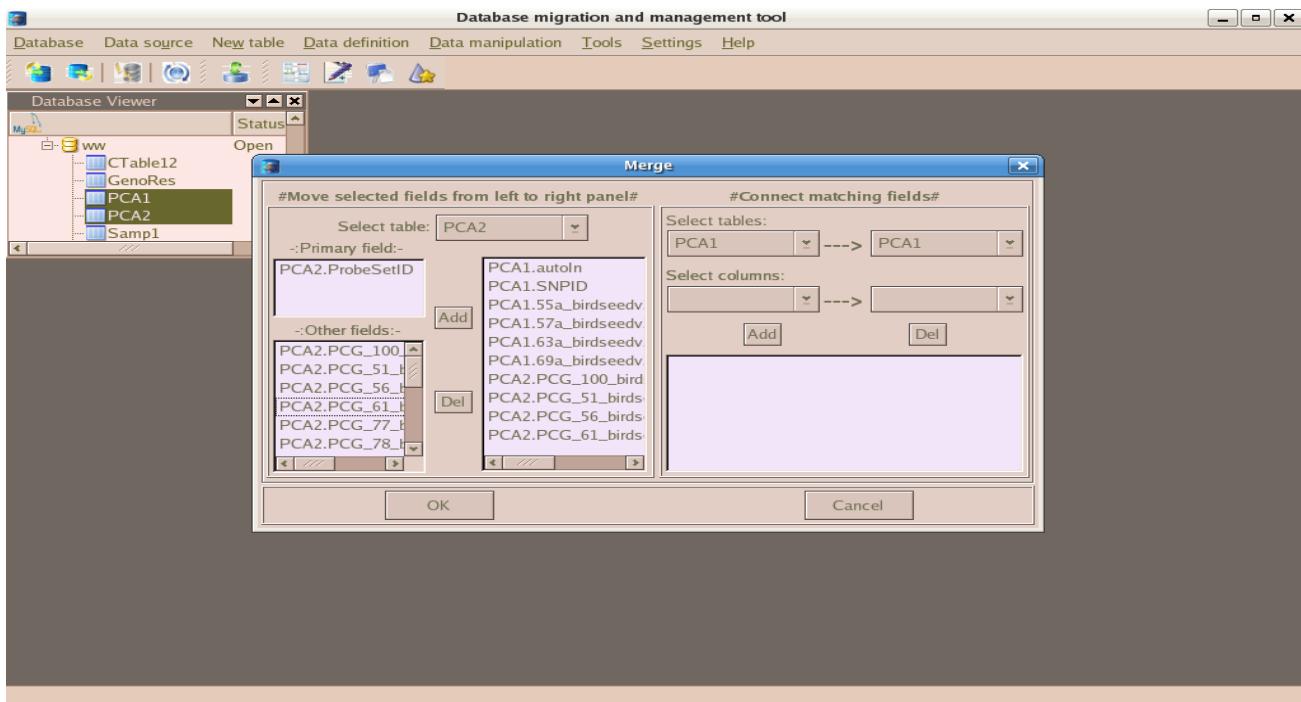
**Figure 3.2.1.6.D.5: Merge table dialog[field/s selection 3]**

If any selected field is required to delete, select that and press the 'Del' button. So, up to this field selection from one table is complete.

Similarly, you can select field/s from other tables. Field selection procedures from table 'PCA2' are as shown in the figures 3.2.1.6.D.6 and 3.2.1.6.D.7 below.

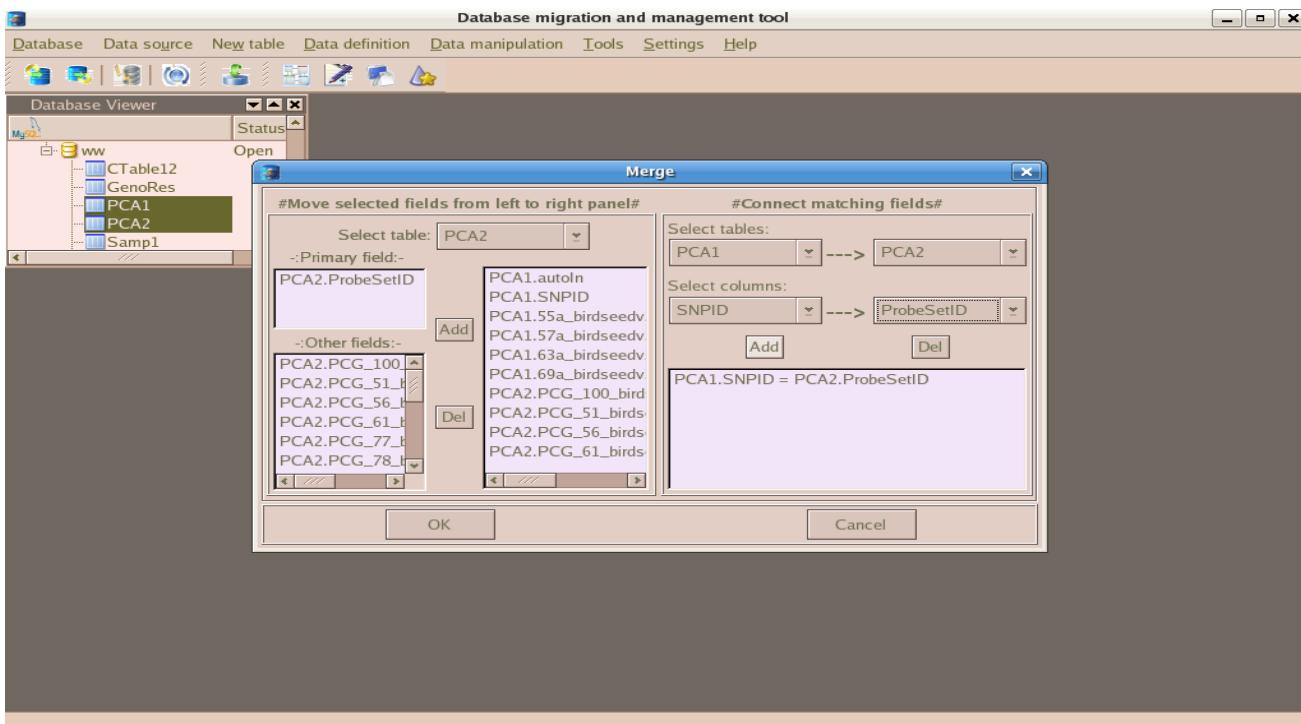


**Figure 3.2.1.6.D.6: Merge table dialog[field/s selection 4]**



**Figure 3.2.1.6.D.7: Merge table dialog[field/s selection 5]**

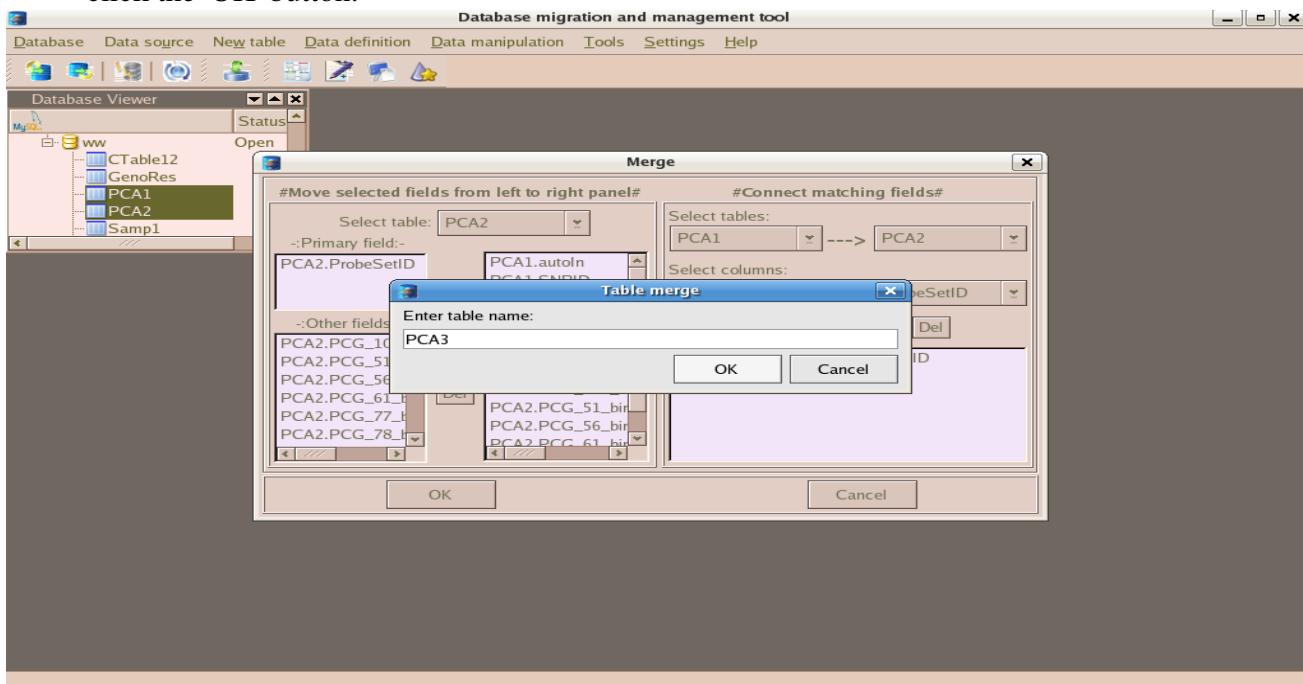
**Step 3:** Now, it is required to connect matching fields. So, focus on the right panel. Here, select tables and appropriate columns for making link as shown in the figure 3.2.1.6.D.8 below.



**Figure 3.2.1.6.D.8: Merge table dialog[Connect matching fields]**

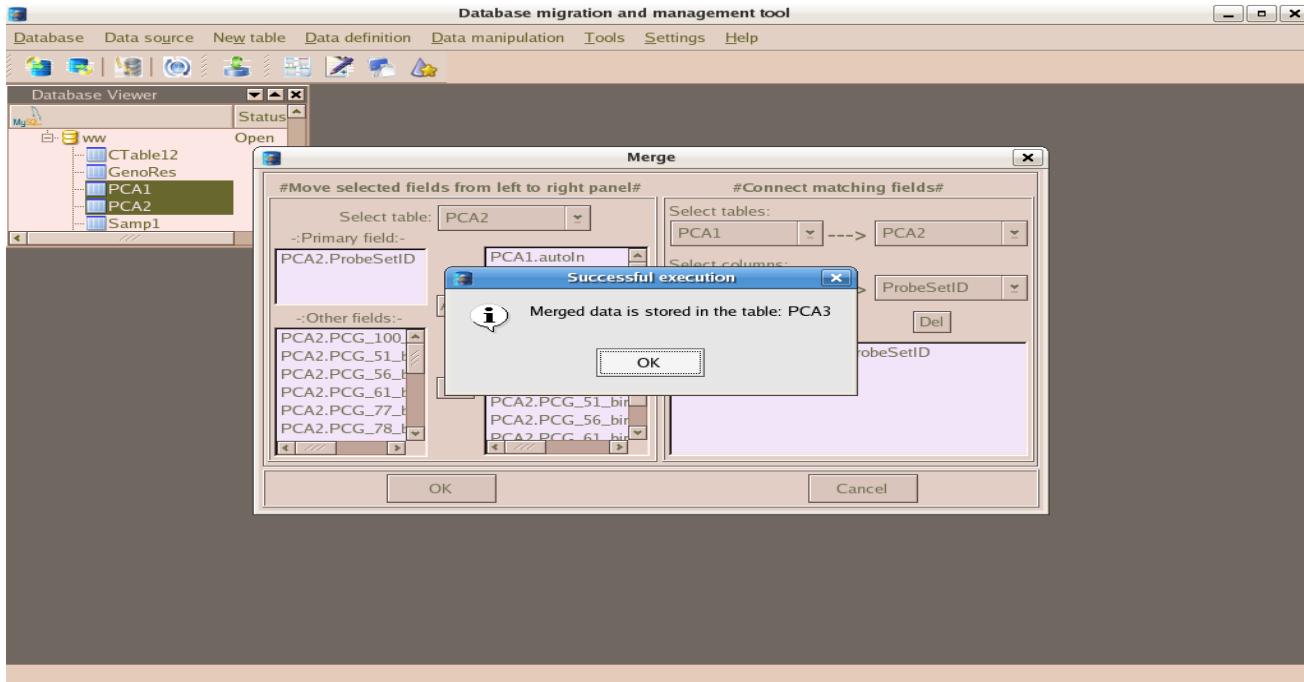
In the example above only one pair of field connection is done between table 'PCA1' and 'PCA2'. You can connect more pairs if required and possible. Since, no validation is provided by this application to check whether connected pair of fields are of similar kind(having similar data types and valid length values) or not do this step carefully.

**Step 4:** Click 'OK' button. A dialog will be prompted asking for a table name where merge data will be stored as shown in the figure 3.2.1.6.D.9. Give the name(in the example 'PCA3') and click the 'OK' button.



**Figure 3.2.1.6.D.9: Merge table dialog[asking for table name]**

**Step 5:** After some while depending on the data size status of this data merge operation will be displayed as shown in the figure 3.2.1.6.D.10 below.



**Figure 3.2.1.6.D.10: Merge table dialog[data merge status]**

**Step 5:** Now, click the 'Refresh database connection' button then open the table 'PCA3' from the database 'ww' to check the result of this merge operation as shown in the figure 3.2.1.6.D.11 below.

PCA3										
	autln	SNPID	55a_birdseedv2	57a_birdseedv2	63a_birdseedv2	69a_birdseedv2	71a_birdseedv2	PCG_100_birds	PCG_51_birds	PCG_5
1	1	SNP_A-8575125	A A	A A	A A	A A	A A	A A	A A	A A
2	2	SNP_A-8575115	B B	B B	B B	B B	B B	0 0	B B	B B
3	3	SNP_A-8575371	B B	B B	B B	B B	B B	B B	B B	B B
4	4	SNP_A-8709646	A A	A A	A A	A A	A B	A A	A A	A B
5	5	SNP_A-8497791	A A	A A	A A	A A	A A	A A	A A	A A
6	6	SNP_A-1909444	B B	B B	A B	B B	B B	A B	A B	A B
7	7	SNP_A-8358063	B B	B B	A B	A B	B B	A B	B B	B B
8	8	SNP_A-8329892	A A	A A	A A	A A	A A	A A	A A	A A
9	9	SNP_A-8408912	B B	B B	A B	B B	B B	A B	A B	B B
10	10	SNP_A-1886933	B B	B B	A B	B B	B B	A B	A B	B B
11	11	SNP_A-2236359	B B	B B	B B	B B	B B	B B	B B	B B
12	12	SNP_A-8515688	B B	B B	0 0	B B	A B	A B	A B	A B
13	13	SNP_A-2205441	A A	A A	A A	A A	A A	A A	A A	A A
14	14	SNP_A-8524447	A A	A B	A A	A A	A A	A A	A A	A A
15	15	SNP_A-8573955	B B	A A	B B	B B	B B	A B	0 0	0 0
16	16	SNP_A-8530278	B B	B B	B B	B B	B B	B B	B B	B B
17	17	SNP_A-8573668	0 0	B B	B B	B B	B B	B B	B B	B B
18	18	SNP_A-8573414	B B	A B	B B	B B	A B	B B	A B	A B
19	19	SNP_A-8531044	A A	A B	A B	A B	A B	A B	A A	A B
20	20	SNP_A-8530320	B B	B B	B B	B B	B B	A B	A B	B B
21	21	SNP_A-8572481	B B	B B	B B	B B	B B	B B	B B	B B
22	22	SNP_A-2116190	A A	A A	A B	A A	A A	A B	A A	

**Figure 3.2.1.6.D.11: Check the merged table 'PCA3'**

- **Function wizard:** This wizard allow user to perform some logical and mathematical operations on table data, column wise. How to use functionalities in this wizard are described below with example.

**Step 1:** Open a table as shown in the figure 3.2.1.6.E.1 below. Here, the table 'Typhoid' is opened from the database 'deba'. Now, click on the button 'Function wizard' or follow,

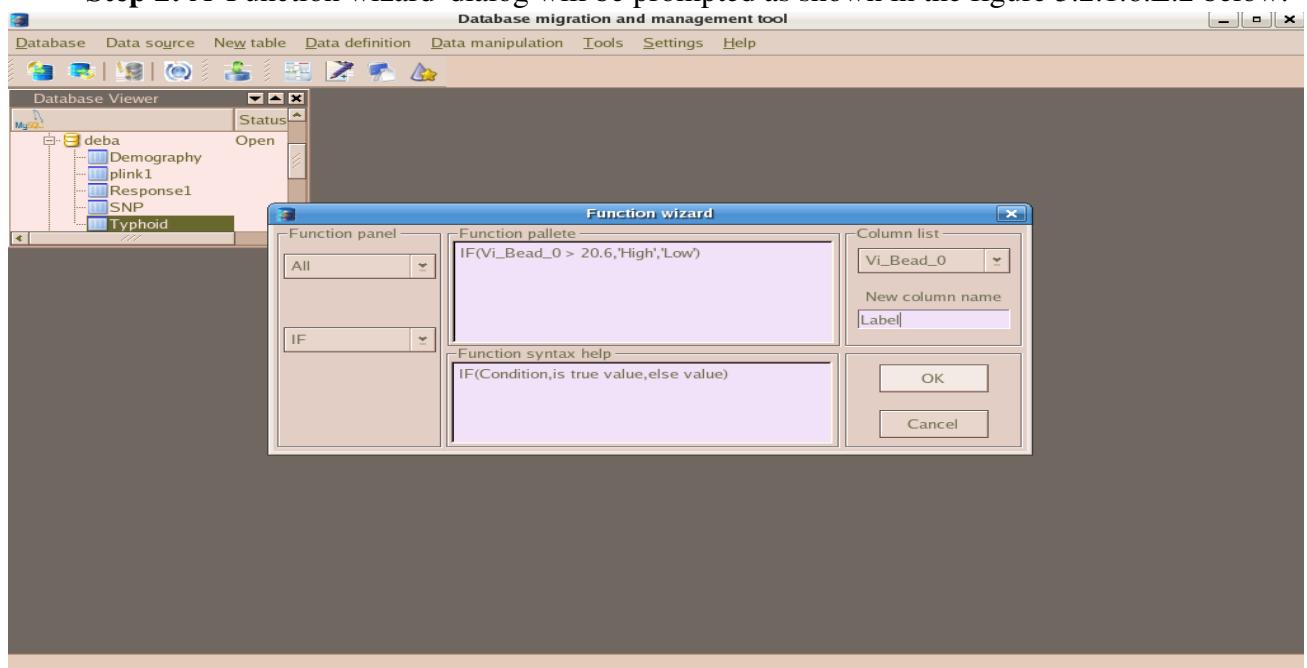
The screenshot shows the 'Database migration and management tool' interface. In the 'Database Viewer' pane, the 'deba' database is selected, and the 'Typhoid' table is open. The 'Function wizard (Shift+F)' button is highlighted in the toolbar. The main window displays the 'Typhoid' table with columns 'Sample\_ID', 'Vi\_Bead\_0', and 'Vi\_Bead\_28', containing 23 rows of data.

	Sample_ID	Vi_Bead_0	Vi_Bead_28
1	IND_1	12.36	14.36
2	IND_2	13.36	15.36
3	IND_3	18.36	20.36
4	IND_4	15.36	17.36
5	IND_5	21.36	23.36
6	IND_6	27.36	30.36
7	IND_7	20.36	23.36
8	IND_8	37.36	44.36
9	IND_9	38.36	46.36
10	IND_10	43.36	45.36
11	IND_11	13.36	15.36
12	IND_12	14.36	16.36
13	IND_13	19.36	25.36
14	IND_14	16.36	18.36
15	IND_15	22.36	34.36
16	IND_16	28.36	30.36
17	IND_17	21.36	23.36
18	IND_18	38.36	40.36
19	IND_19	39.36	41.36
20	IND_20	44.36	46.36
21	IND_22	14.36	17.36
22	IND_23	15.36	18.36
23	IND_24	20.36	27.36

**Figure 3.2.1.6.E.1: Table 'typhoid' is opened from database 'deba'**

'Tools -> function wizard'.

**Step 2:** A 'Function wizard' dialog will be prompted as shown in the figure 3.2.1.6.E.2 below.



**Figure 3.2.1.6.E.2: Function wizard dialog['IF()']**

**Example 1:** As shown in the figure above, select 'IF()' conditional expression. It's usage syntax is displayed. Place the cursor in between the brackets of the expression in the 'Function pallet'. Select an appropriate column from drop down list under the 'Column list'. 'Vi\_Bead\_0' is selected. It will be placed at the cursor position within the bracket of the 'IF' expression. Now, say we want to create a new column in the table 'Typhoid' which will store the value 'High' if corresponding row wise value in 'Vi\_Bead\_0' is greater than 20.6. Else it will store 'Low'. So, we complete the expression 'IF(Vi\_Bead\_0 > 20.6,'High','Low') as shown in the figure above.

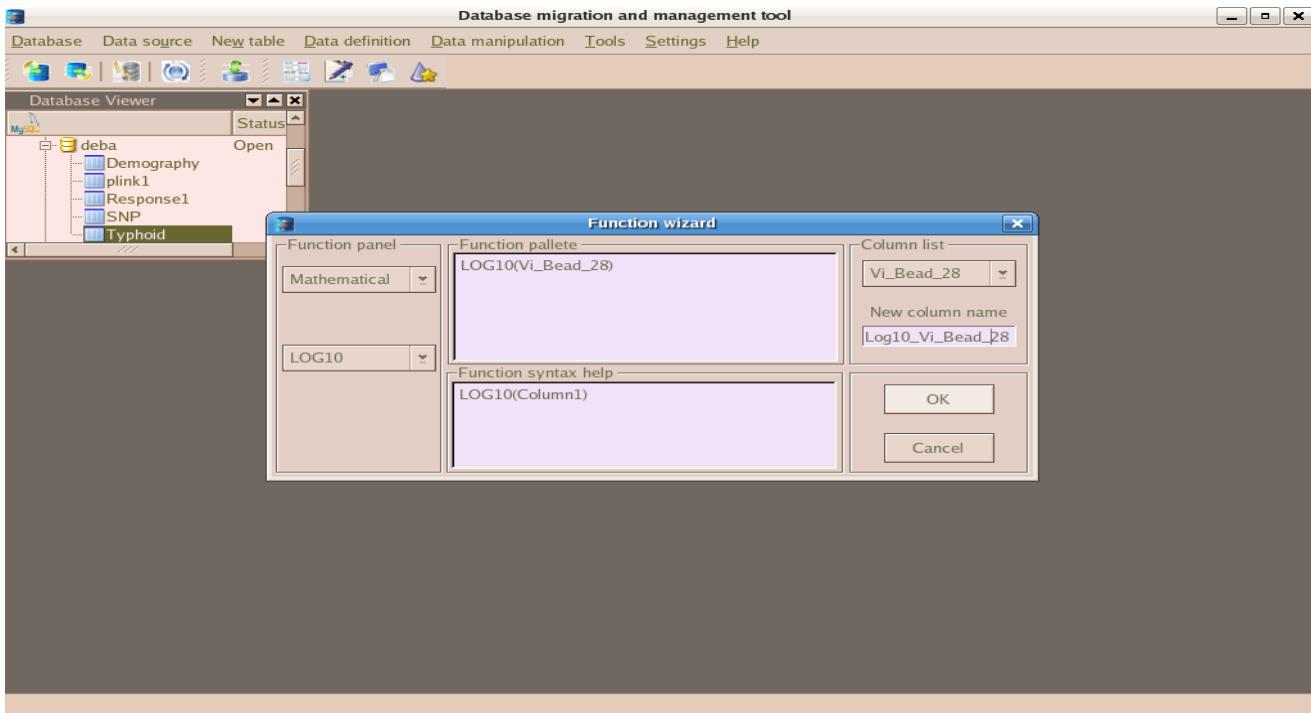
Give new column name under 'New column name' label. Then, press the 'OK' button.

If the operation is done successfully, while opening the table 'Typhoid', you will find the new column 'Label' in the table with desired values as shown in the figure 3.2.1.6.E.3 below.

	Sample_ID	Vi_Bead_0	Vi_Bead_28	Label
1	IND_1	12.36	14.36	Low
2	IND_2	13.36	15.36	Low
3	IND_3	18.36	20.36	Low
4	IND_4	15.36	17.36	Low
5	IND_5	21.36	23.36	High
6	IND_6	27.36	30.36	High
7	IND_7	20.36	23.36	Low
8	IND_8	37.36	44.36	High
9	IND_9	38.36	46.36	High
10	IND_10	43.36	45.36	High
11	IND_11	13.36	15.36	Low
12	IND_12	14.36	16.36	Low
13	IND_13	19.36	25.36	Low
14	IND_14	16.36	18.36	Low
15	IND_15	22.36	34.36	High
16	IND_16	28.36	30.36	High
17	IND_17	21.36	23.36	High
18	IND_18	38.36	40.36	High
19	IND_19	39.36	41.36	High
20	IND_20	44.36	46.36	High
21	IND_22	14.36	17.36	Low
22	IND_23	15.36	18.36	Low
23	IND_24	20.36	27.36	Low

**Figure 3.2.1.6.E.3: Result of 'IF()' expression in the table 'Typhoid'**

**Example 2:** Let's try with another one. As shown in the figure 3.2.1.2.H.4 below, LOG10() is taken on column 'Vi\_Bead\_28'. Result of taking LOG10(Vi\_Bead\_28) is as shown in the figure 3.2.1.6.E.4 below.



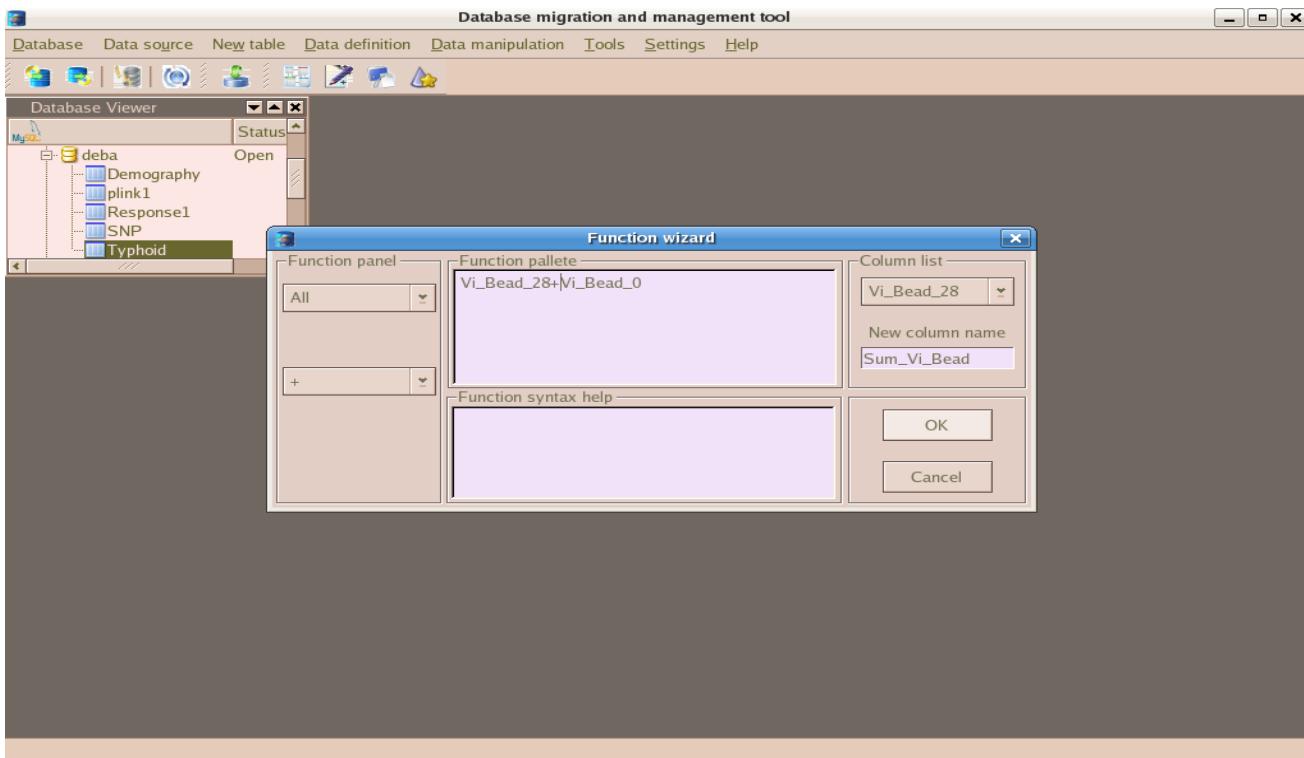
**Figure 3.2.1.6.E.4: Function wizard dialog['LOG10']**

The screenshot shows the 'Database migration and management tool' interface with the 'Typhoid' table selected in the database viewer. The table has columns: Sample\_ID, Vi\_Bead\_0, Vi\_Bead\_28, Label, and Log10\_Vi\_Bead. The data consists of 23 rows, each with a unique ID from 1 to 23 and corresponding values for the other columns. The 'Log10\_Vi\_Bead' column contains the calculated logarithmic values. The table is displayed in a grid format with horizontal and vertical scroll bars.

	Sample_ID	Vi_Bead_0	Vi_Bead_28	Label	Log10_Vi_Bead
1	IND_1	12.36	14.36	Low	1.157154429523
2	IND_2	13.36	15.36	Low	1.186391205988
3	IND_3	18.36	20.36	Low	1.30877786683
4	IND_4	15.36	17.36	Low	1.239549736109
5	IND_5	21.36	23.36	High	1.368472849787
6	IND_6	27.36	30.36	High	1.482301775954
7	IND_7	20.36	23.36	Low	1.368472849787
8	IND_8	37.36	44.36	High	1.646991543452
9	IND_9	38.36	46.36	High	1.666143433009
10	IND_10	43.36	45.36	High	1.656673051728
11	IND_11	13.36	15.36	Low	1.186391205988
12	IND_12	14.36	16.36	Low	1.213783315537
13	IND_13	19.36	25.36	Low	1.404149259662
14	IND_14	16.36	18.36	Low	1.263872691302
15	IND_15	22.36	34.36	High	1.536053162873
16	IND_16	28.36	30.36	High	1.482301775954
17	IND_17	21.36	23.36	High	1.368472849787
18	IND_18	38.36	40.36	High	1.605951164132
19	IND_19	39.36	41.36	High	1.616580536494
20	IND_20	44.36	46.36	High	1.666143433009
21	IND_22	14.36	17.36	Low	1.239549736109
22	IND_23	15.36	18.36	Low	1.263872691302
23	IND_24	20.36	27.36	Low	1.437116102736

**Figure 3.2.1.6.E.5: Result of 'LOG10('Vi\_Bead\_28')' in the table 'Typhoid'**

**Example 3:** Try with another last one. As shown in the figure 3.2.1.6.E below, column 'Vi\_Bead\_28' and 'Vi\_Bead\_0' is added. Result of addition is as shown in the figure 3.2.1.6.E.7 below.

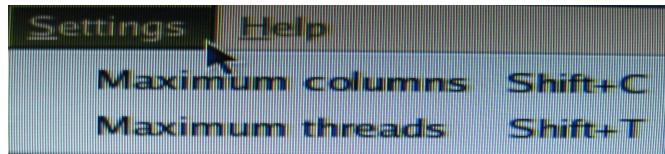


**Figure 3.2.1.6.E.6: Function wizard dialog[Vi Bead 0 + Vi Bead 28]**

Sample_ID	Vi_Bead_0	Vi_Bead_28	Label	Log10_Vi_Bead	Sum_Vi_Bead
1 D_1	12.36	14.36	Low	1.157154429523	26.72
2 D_2	13.36	15.36	Low	1.186391205988	28.72
3 D_3	18.36	20.36	Low	1.308777786683	38.72
4 D_4	15.36	17.36	Low	1.239549736109	32.72
5 D_5	21.36	23.36	High	1.368472849787	44.72
6 D_6	27.36	30.36	High	1.482301775954	57.72
7 D_7	20.36	23.36	Low	1.368472849787	43.72
8 D_8	37.36	44.36	High	1.646991543452	81.72
9 D_9	38.36	46.36	High	1.666143433009	84.72
10 D_10	43.36	45.36	High	1.656673051728	88.72
11 D_11	13.36	15.36	Low	1.186391205988	28.72
12 D_12	14.36	16.36	Low	1.213783315537	30.72
13 D_13	19.36	25.36	Low	1.404149259662	44.72
14 D_14	16.36	18.36	Low	1.263872691302	34.72
15 D_15	22.36	34.36	High	1.536053162873	56.72
16 D_16	28.36	30.36	High	1.482301775954	58.72
17 D_17	21.36	23.36	High	1.368472849787	44.72
18 D_18	38.36	40.36	High	1.605951164132	78.72
19 D_19	39.36	41.36	High	1.616580536494	80.72
20 D_20	44.36	46.36	High	1.666143433009	90.72
21 D_22	14.36	17.36	Low	1.239549736109	31.72
22 D_23	15.36	18.36	Low	1.263872691302	33.72

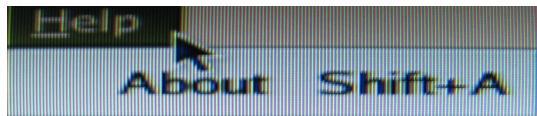
**Figure 3.2.1.6.E.7: Result of 'Vi Bead 0 + Vi Bead 28' in the table 'Typhoid'**

### **3.2.1.7 Settings:**



You can change maximum columns (max 2000 system specified) allowed per database table and maximum threads (min 10 max 40 recommended) used by our system for transpose operation from this menu items.

### **3.2.1.8 Help:**



Use this menu item to know about our application.



### **3.2.2 Key features of our application:**

- You can import data from one/more input data file/s to a single/multiple database table/s in a single import operation.
- Your input datafile may be very large. In that case our application will store data in multiple tables(if it is required) which you can say partitions of a single table.
- Our application can transpose very large data files containing data in tabular form spending minimal amount of time.
- Unlimited undo/redo facilities for update and delete events on the table data(This facility is given for editing filtered data using “Data Analyzer” dialog).

### **3.2.3 Pitfall:**

This release is considered a stable release, although please remember that we cannot guarantee that it, just like most computer programs, does not contain bugs. If any time this application gets hanged or doesn't respond, just quit the application forcefully and restart. Then delete any affected table or file from its location to work smoothly.