

GPAD: General Purpose Analysis Desktop

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Introduction

General Purpose Analysis Desktop (GPAD) is an application encompassing a bundle of utilities for database access, data analysis, etc. Today GPAD supports SQL, MySQL, MariaDB, Access and Excel. Easy to use utilities allow users to do data analysis, data mining, process optimization, etc. Rendering images from database is also available with several functionalities including file sharing via e-mail. Image files from local computers can also be accessed, rendered and shared using e-mail. Image cropping utility is also included to create new images with comments or just thumbnails. A feature that displays files content in ASCII or Hexadecimal is also included to analyze file content. The feature is a useful tool to understand file format, etc. GPAD brings users together by using “**Chat**” utility embedded in GPAD.

GPAD is intended for grad-students, engineers and scientists. It is also useful for people in manufacturing sustaining processes, or individuals willing to learn and use database and take advantage of the utilities included in GPAD.

1 GPAD Deployment

GPAD (General Purpose Analysis Desktop) is a bundle of pure Java applications including database connection and data analysis, image rendering and cropping, etc. Today, GPAD supports Java Runtime (JRE) 1.6.0 to 1.10. To find out your computer's Java version, open a "Command Prompt" window and type "java -version":

- C:\user> java -version

To open a "Command Prompt" window go to "start" then "Run". In the "Run" window, type "cmd" and click on "OK".

"Command Prompt" can also be launched from "start", "All Programs" and "Accessories".

If your computer's JRE is JRE1.5.x or older, upgrade versions can be downloaded from Oracle at:

http://www.java.com/en/download/windows_ie.jsp?locale=en&host=www.java.com:80.

Today, GPAD application is deployed over the internet at <http://www.tekinsil.com/downloads/gpadDeploy.html>. Once GPAD is installed, a batch file "gpadLocalX.bat" is created according to user system operating system and placed in user desktop. "X" denotes the version minor of Java Runtime. A batch link is also placed in desktop for updates "gpadInstallerWebStartX.bat".

Users can also create a shortcut to their desktop and let Java "WebStart" utility launch GPAD. The shortcut target text field must include the following line:

```
"C:\Program Files\Java\jreX\bin\javaws.exe" http://www.tekinsil.com/downloads/gpadInstallerWebStartX.jnlp
```

The full path "WebStart" executable "C:\Program Files\Java\jreX\bin\javaws.exe" depends on the user setup or computer environment. The sub-directory jre.x can also be under this format jre.1.x.y. Users must determine the actual path in their system. If this document supports hyperlink capability users can run the application by clicking on the link! Also, notice the space between the java full path and the URL.

First deployment of GPAD, which is online, may not proceed due to security measures in recent "Java Virtual Machines". Next paragraph shows online deployment process.

1.1 Online deployment of GPAD

Some security measures can prevent online deployment of GPAD. These security measures depend on user java version. Users may have to adjust the security conditions so to allow the deployment. To see current java security go to system "Control Panel", then, select "Java". A window "Java Control Panel" opens. If "Java" in "Control Panel" cannot be found, go to "start", then "Run" and type "javaws -viewer". Or open a "Command Prompt" window and type "javaws -viewer":

- C:\user>javaws -viewer

In "Java Control Panel" select "Security" tab. The security measures depend on Java version. The following recommendations help deploying GPAD over the internet:

- Java 1.6.x: Typically "Java virtual Machine" checks for security certificates but deployment is not affected
- Java 1.7.x: click on "Edit Site List...", "Exception Site List" is displayed. Add <http://www.tekinsil.com> to this list
- Java 1.8.x: click on "Edit Site List...", "Exception Site List" is displayed. Add <http://www.tekinsil.com> to this list
- Java 1.9.x: click on "Edit Site List...", "Exception Site List" is displayed. Add <http://www.tekinsil.com> to this list
- Java 1.10.x: click on "Edit Site List...", "Exception Site List" is displayed. Add <http://www.tekinsil.com> to this list

When deploying GPAD for the first time, work directories are created in user home directory:

- ~\GPADTek\gpad_downloads default directory to store file downloads
- ~\GPADTek\gpad_support to store resource/support files that that help GPAD with the various functionalities
- ~\GPADTek\gpad_output to store reports
- ~\GPADTek\gpad_mailed_images to store temporarily image files for email

- ~\GPADTek\gpad_single_images to store analysis images
- ~\GPADTek\gpad_history for recording each session history in files. First time deployment creates “Readme.html” file placed in this directory. This file describes user environments etc. The sign “~” denotes user home directory path.

After creating the work directories, resource/support files are downloaded and placed in “user_home_directory_path\gpadTek\gpad_support” directory. The resource files depend on the Java Runtime (**JRE**) version.

For JRE versions 1.6, 1.7, 1.8 the support files:

- mail.jar
- mysql-connector-java-5.0.8-bin.jar
- sqljdbc4.jar

For JRE 1.9 and 1.10 the support files are:

- javax.mail.jar
- activation.jar
- commons-codec-1.11.jar
- mysql-connector-java-5.0.8-bin.jar
- mssql-jdbc-6.4.0.jre9.jar

Once the GPAD environment is created users can elect to download a current version of GPAD to run from their computer instead of the internet. It is recommended to download GPAD for full functionality.

1.1.1 Local deployment of GPAD

For those who did not chose to run GPAD from their computer (instead of the internet) in the initial deployment of GPAD (internet version), can download a current version of GPAD to their computer. To do so, from GPAD main menu, got to “**Help**”, than “**Run GPAD from this computer**”. A copy of GPAD application is placed in GPAD folder located in user home directory. A link to deploy GPAD is placed in the desktop.

1.1.2 Email setup

During first time deployment of GPAD, e-mail setup dialog is displayed. Today, GPAD supports SMTP protocol. **Figure 1** shows e-mail dialog. Email parameters and credentials are gathered and saved in “**smtp.gpad**”. If “**smtp.gpad**” file is missing, e-mail cannot be sent. Verify with your system administrator or Internet service provider (**ISP**) e-mail server address.

The conventional way for a mail client programs to send e-mail relies on **TCP port#25**. A port used by mail servers to talk to each other. However, port#25 is widely used to spread malware and spam. As a result, ISP’s are restricting its use, and offer connection with authentication such as port#2626. More secure connections include **Security Sockets Layer (SSL) connection and its successor Transport Layer Security (TLS)**. For example, **Comcast** uses port#587 (TLS). Gmail uses port#25, 587 (TLS) and 465 (SSL). Gmail users do also have security options in their e-mail account (see link: <https://support.google.com/a/answer/17666>). Other e-mail users need to check with their **ISP** or E-mail provider, the actual port and connection type.

When ports other than port#25 are used, GPAD prompts for authentication password. If the user elects to store the password, encrypted password is saved.

1.1.3 Database setup

GPAD also uses “ports.gpad” file to store the port number of each database supported by GPAD. Ports#1433 and 3306 are the default port numbers dedicated to “Microsoft SQL” and “MySQL/MariaDB”, respectively. Other ports can be used. Verify the exact port number actually used for the database you intend to use. If the ports are different than the default ports, edit “ports.gpad” file to update port number. Or use GPAD to manage the ports (see “3.1.4 Database Ports”). File “ports.gpad” should not be deleted!

1.1.4 License

License granting the use of GPAD is stored in file license “**license.gpad**”. It is also used to determine between a “new user” and returning user. Once the file is created GPAD assumes the user is a “returning user” and support files were already downloaded during the initial deployment of GPAD. First time users will have “Readme.html” file placed in “gpad_history” directory describing the download process as well as key directories and user computer environment.



Figure 1: Email-setup dialog. When authentication is needed, user can elect to store the authentication. Otherwise, users will be prompted for authentication when sending e-mail.

1.2 Local machine deployment

If users wish to run GPAD locally they can download GPAD to deploy directly from their computer. In the “**Help**” tab of the main GPAD menu, select “**Run GPAD from this computer**” The download process consists of creating a folder “**GPAD**” in “**user home directory**”. Then a recent copy of the application and third party support files are downloaded to the “**GPAD**” folder. A batch file “**gpadLocalX**” is created according to user operating system (**OS**), and placed in “**user desktop**”. “**X**” in “**gpadLocalX**” denotes java version minor. To run GPAD click on “**gpadLocalX**” file icon.

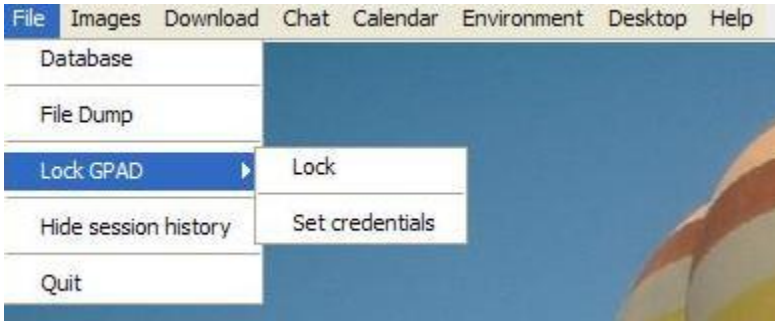


Figure 2: File menu.

2 Using GPAD

2.1 GPAD Main Menus

2.1.1 File

“**File**” menu as shown in **Figure 2** includes:

- “**Database**” which launches “**Database Control Manager**” utility for database connection and data analysis (see 3.2 Database connections)
- “**File Dump**” launches an application to display files in ASCII or Hexadecimal for file content analysis
- “**Lock GPAD**” allows user to lock and unlock GPAD when needed
- And “**Quit**” to close GPAD application

2.1.2 Images

Figure 3 shows “Images” menu. The menu includes:

- “**Rendering image**” for seamless streaming of images from user’s file system (see paragraph “3.3.3 Render images”)
- “**Crop images**” to launch image cropping utility (see “6 Image Cropping”)
- “**Mail images**” for e-mailing image or other files
- “**JPEG Explorer**” to launch an utility to explore JPEG files data (see “8 JPEG Explorer”)

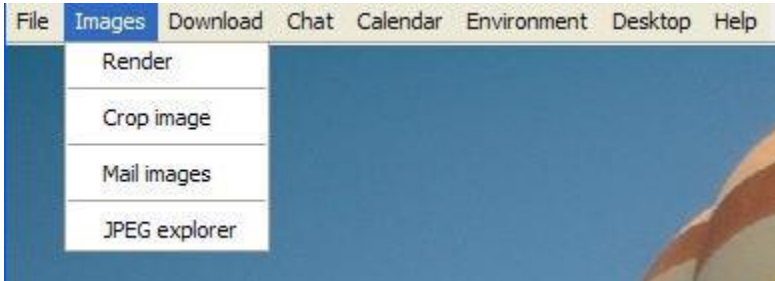


Figure 3: Images menu.

2.1.3 Downloads

“Download” menu includes utility to download files from the Internet (**Figure 4**). Today, only “**http protocol**” is supported.

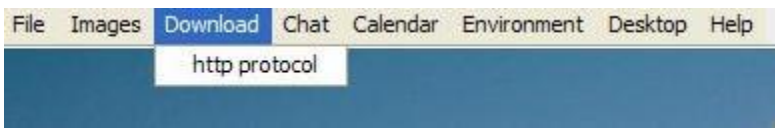


Figure 4: Download manager.

2.1.4 Chat

Basic chat utility (**Figure 5**) is integrated into GPAD to allow GPAD users to communicate and share their experience using GPAD (see “**Error! Reference source not found. Error! Reference source not found.**”).

- “**Start chat**” starts a chat session
- “**Receiver status**” to turn “on” or “off” chat receiver during GPAD session
- “**Turn on/off**” enables or disables chat application

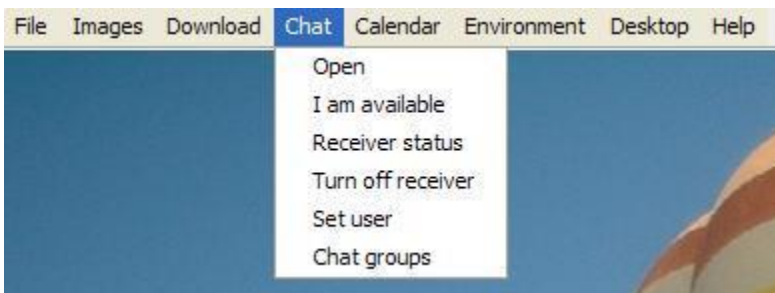


Figure 5: Chat tab.

2.1.5 Environment

Parameters used for the GPAD environment are stored in your computer and can be revisited from the Environment tab (**Figure 6**). For example to update e-mail parameters select “**E-Mail**” tab. A window like that in **Figure 1** will open to update e-mail information.



Figure 6: Environment menu.

2.1.6 Desktop

Figure 7 shows “Desktop” menu.

- “**Background image**” tab allows users to personalize GPAD background image. Select “**New image**” tab to change current background image. Tab “**Use default**” displays default image which is embedded in GPAD.
- “**Minimize**” tab allows users to switch back to their computer desktop. For example “Windows”.



Figure 7: Desktop tab.



Figure 8: Help Menu.

2.1.7 Help

Few options are provides for the “**Help**” menu (Figure 8):

- “**About GPAD**” Shows a short description of GPAD
- “**GPAD version**” To show the currently used version
- “**Run GPAD from this computer**” While initial GPAD deployment is done over the internet, users can download GPAD application to their computer. In the download process a batch file “gpadLocal.bat” is created and placed in the computer desktop. GPAD is launched by clicking on the batch file icon. However, GPAD is continuously updated and enhanced. Therefore users are asked to download a newer version once in a while.
- “**Online manual**” allows user to access GPAD manual online. GPAD launches user default browser with link to the PDF manual.
- “**Inquiring about GPAD!**” allows users to contact GPAD developers. GPAD opens the contact form in user default browser.
- “**Will not use GPAD anymore!**” For those who wish to not use GPAD. In this case, GPAD attempts to remove files that are not needed by users.

3 Database Control Manager

“Database Control Manager” is shown in Figure 9. GPAD supports connections to multiple databases, create and manipulate tables, analyze data, etc. To launch the “Database Control Manager” utility select “File” then “Database”.

3.1 Database

Figure 10 shows “Database” menu and sub-menus.

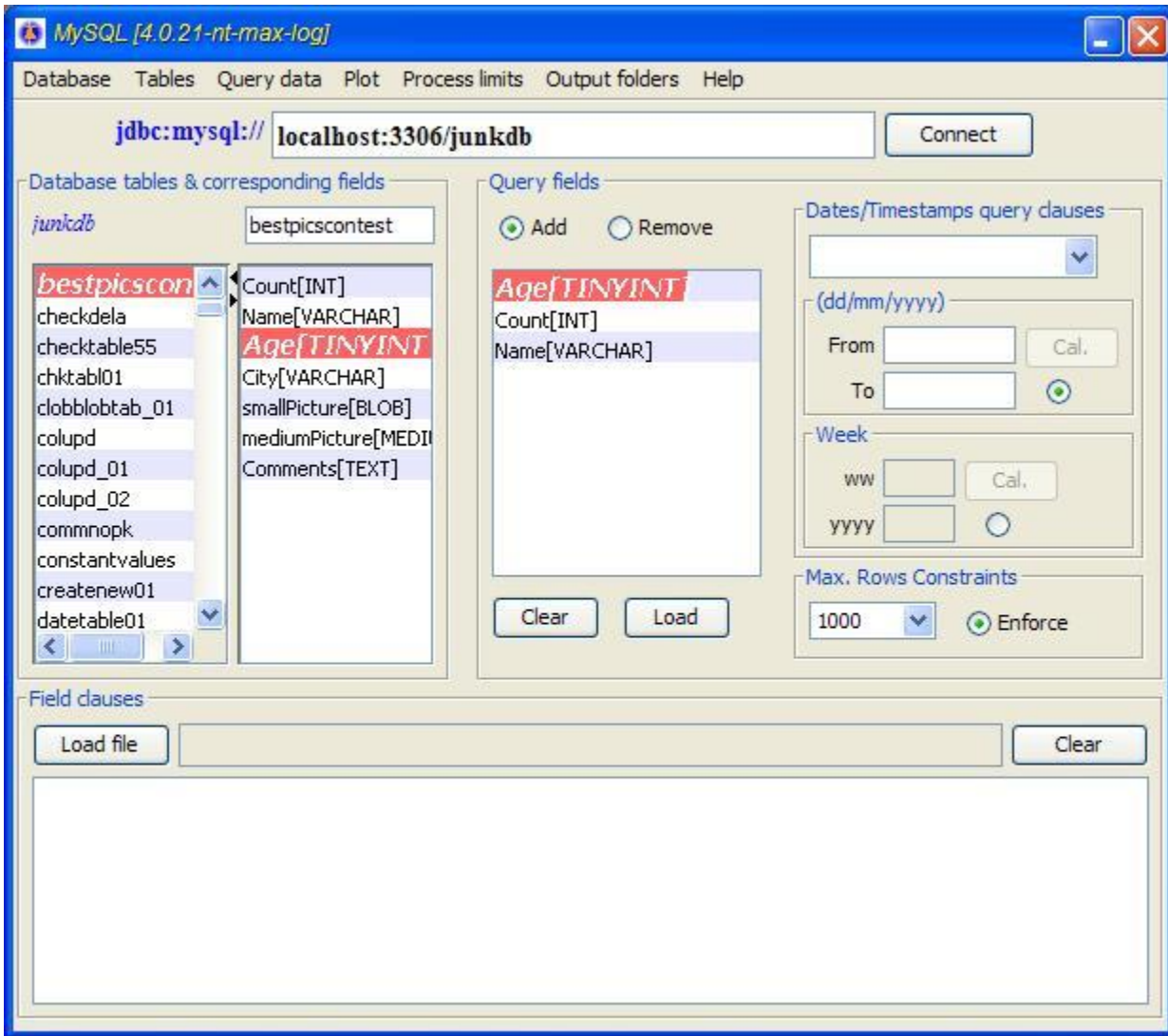


Figure 9: Database Control Manager Window.

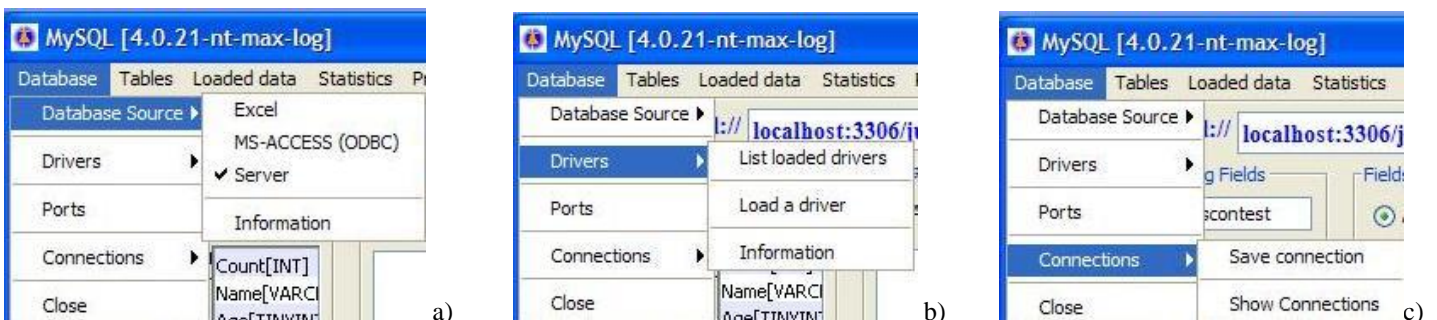


Figure 10: Database Control Manager Menus with corresponding sub-menus.

3.1.1 Database source

GPAD supports database servers (**MySQL**, **MariaDB** and **Microsoft SQL**), “**ACCESS**” databases and “**Excel**” Files. For each database a driver and a listening port must be known so to connect successfully to the databases.

3.1.2 Information

Database server information can be displayed using “**Information**” tab. The information becomes available only when a connection to a database is established. The information includes database server manufacturer and database version.

3.1.3 Drivers

In order to access a specific database server, a driver is needed. Currently GPAD supports Microsoft driver “**com.microsoft.sqlserver.jdbc.SQLServerDriver**” for 2005-08 databases, MySQL driver “**com.mysql.jdbc.Driver**” and ODBC driver “**sun.jdbc.odbc.JdbcOdbcDriver**”. Currently, **GPAD accepts only MySQL driver for MariaDB**. The following drivers have been tested:

- MySQL driver: “**com.mysql.jdbc.Driver**”, version #5.0.8 now in file “mysql-connector-java-5.0.8-bin.jar” located in user java library.
- MariaDB driver: “**com.mysql.jdbc.Driver**”, version #5.0.8 now in file “mysql-connector-java-5.0.8-bin.jar” located in user java library. If a MariaDB driver exists in java library, the driver is loaded automatically when invoking java. This is a MariaDB feature. This future lead to conflicts when using MySQL (see **Known issues** below).
- Microsoft SQL driver: “**com.microsoft.sqlserver.jdbc.SQLServerDriver**”, version#1.2.2828.100” now in file “sqljdbc.jar” located in user java library.
- ACCESS driver: “**sun.jdbc.odbc.JdbcOdbcDriver**” is tied to the Java installed in user computer. Access driver version may depend on Java version. The driver is automatically loaded when Java is opened. Java has supported this driver up to **JRE version 1.7**.

3.1.3.1 Load a driver

GPAD support **Microsoft SQL**, **MySQL** and **MariaDB** databases. To load a driver from **Database** menu select **Drivers**, then “**Load a driver**” (**Figure 10b**). However, recent drivers are loaded automatically by the JVM (Java Virtual Machine). GPAD ensures that only one instance of driver is created.

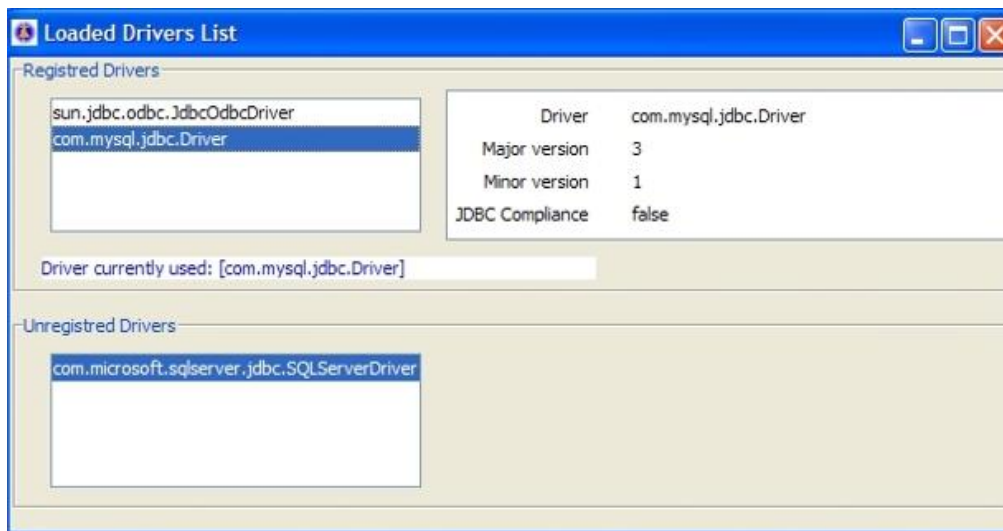


Figure 11: Loaded database drivers list: Registered drivers list (top - left), selected driver properties (right). Unregistered drivers list (bottom). Once unregistered, drivers’ manager ignores these drivers.

3.1.3.2 List loaded drivers

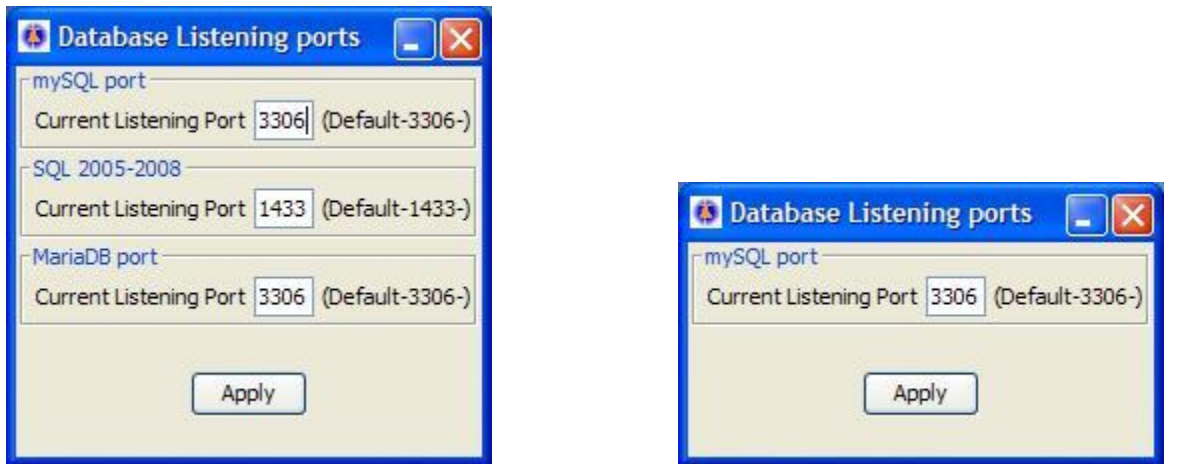
To list currently loaded drivers in GPAD select “List loaded drivers” from the “Drivers” menu. **Figure 11** shows an example of a list of loaded database drivers. Once a driver is loaded at runtime or automatically when Java is opened, the driver is automatically registered; meaning the driver is accessible by the drivers’ manager. Drivers can be unregistered. Once unregistered, drivers’ manager ignores these drivers. To unregister a driver, double-click on the driver from the registered drivers list. To register back a driver, select the driver from the unregistered drivers list.

3.1.3.3 Information

Information about currently used driver can be displayed by using “Information” tab. The driver maker and driver version are displayed.

3.1.4 Database Ports

Default database listening ports are #3306, #1433 for MySQL/MariaDB and Microsoft SQL, respectively. To set the default port select “Ports” tab from “Database Control Manager”. **Figure 12** shows port dialogs.



a) Supported databases listening ports number

b) Currently used database listening port number

Figure 12: Database listening port number. If no connection is established dialog (a) is displayed. If a connection is made dialog (b) is shown. To set port number enter the number in the text field and click on “Apply” button.



Figure 13: Typical connection procedure to Microsoft SQL. Database “junkdb2” specified (a), database and table “imgTab_01” specified (b), and final syntax (c). “DatabaseName” is not case sensitive.

3.2 Database connections

3.2.1 Connection to Microsoft-SQL

Connecting to Microsoft SQL database is shown in **Figure 13** :

- Type the link with the database name. For example: “192.168.1.104:3306;DatabaseName=junkdb2”, or “192.168.1.104:3306;DatabaseName=junkdb2;imgTab_01” to access directly the table “imgTab_01” in database “junkdb2”
- Click on “Go” button or hit “enter”, Microsoft SQL database driver is selected
- A login dialog is displayed. Once the authentication process is done, the tables list is populated with tables found in database “junkdb2”. If the table is specified, for example “imgTab_01”, the table fields/columns are displayed
- Select a table. Or use the auto-fill to find a table. A counter window pops-up showing the number of fields found in the table. The fields and corresponding data type “[type]” are displayed in “Tables & Corresponding Fields” list

If the database is not known, type the server IP, for example “192.168.1.104”. A dialog will assist through the connection process. Connection credentials are saved as long as “Database Control Manager” is still open. If the “Database Control Manager” is closed these credentials are eliminated. Opening a new Database Control Manager window requires a new authentication.

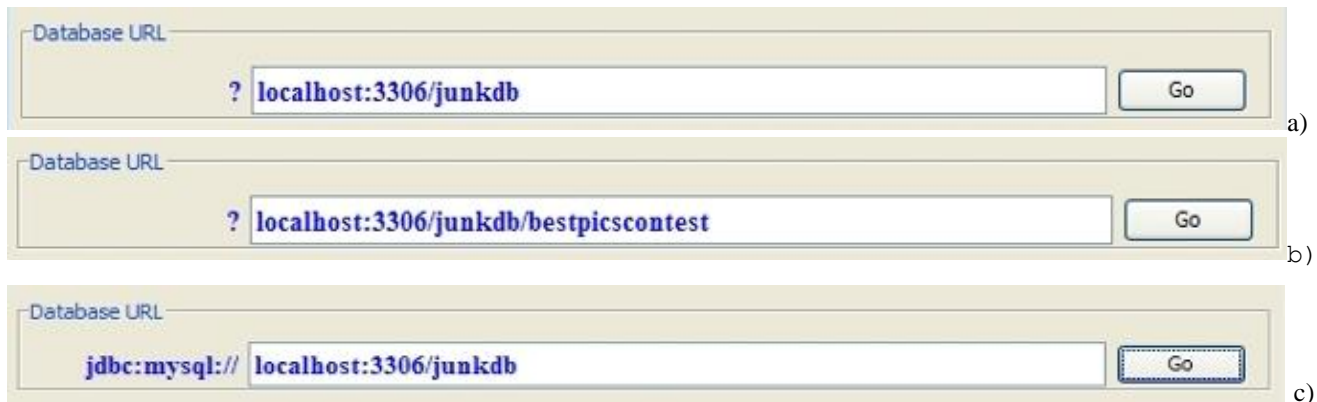


Figure 14: Typical connection procedure to MySQL/MariaDB. Database “junkdb” specified (a), database and table “bestpicscontest” specified (b), and final syntax (c).

3.2.2 MySQL/MariaDB database connection

MySQL and MariaDB databases have similar connection syntax. Typical connection syntax is shown in Figure 14.

- Type the link with the database name. For example “localhost:3306/junkdb”, or “localhost:3306/junkdb/bestpicscontest” to access directly the table “bestpicscontest” in database “junkdb”
- Click on “Go” button or hit “enter”, MySQL database driver is selected
- A login dialog is displayed. Once the authentication process is done, the tables list is populated with tables found in database “junkdb”. If the table is specified, for example “bestpicscontest” the table fields/columns are displayed
- Select a table. Or use the auto-fill to find table. A counter window pops-up showing the number of fields found in the table. The fields and corresponding data type “[type]” are displayed in “Tables & Corresponding Fields” list

If the database is not known, type the server “name” or “IP”, for example “localhost”. A guide dialog will assist through the connection process. Connection credentials are saved as long as “Database Control Manager” is still open. If “Database Control Manager” is closed, these credentials are eliminated. Opening a new “Database Control Manager” window requires a new authentication.

3.2.3 Microsoft ACCESS - ODBC Data Source

3.2.3.1 Setting up ACCESS-ODBC Data Source for Windows OS

Microsoft Windows users have the option to use ODBC for database. The following guidelines explain how to create an ODBC Data source:

- Click on “Start” tab for Windows based computer
- Select “Control Panel”

- Select “**Administrative Tools**”
- Select “**Data Sources (ODBC)**”. Microsoft ODBC Data Source Administrator window opens
- Select “**System DSN**” tab
- Click on “**Add**” button to add a “**Data Source**”
- Select driver “**Driver do Microsoft Access (.mdb)**”
- In “**ODBC Microsoft Access Setup**” manager enter “**Data Source name**” and a brief description
- In “**ODBC Microsoft Access Setup**” manager, below the authentication text fields, click on “**CREATE**” button to create the database. You will also select the directory were this database will reside. If the directory does not exist, go to your computer’s “**file/directory**” manager and create this directory then go back to “**ODBC Microsoft Access Setup**” manager. In the text field “**Database Name**” enter the name of the data source with extension “**.mdb**”. The **Data Source** will now point to the database. When accessing ODBC this Data Source name is needed
- Click on “**Advanced**” button if you want to add authentication to access this **Data Source**

Data Source is now ready to accept tables.

3.2.3.2 Accessing ACCESS - ODBC Data Source

To access ODBC tables:

- Select “**Control**”, “**Database Server**” and “**Data-Source (ODBC)**”. The Data Source should have been created already (see “3.2.3.1 Setting up ACCESS-ODBC Data Source for Windows OS”)
- In “**Data Source**” dialog enter “**Data Source**” name
- A login dialog is displayed. Once the authentication is done, the table list is populated with tables belonging to the data source
- Select a table. Or use the auto-fill to find a table. A counter window pops-up showing fields count found in the table. The fields and corresponding data “[type]” are displayed in “**Tables & Corresponding Fields**” list.

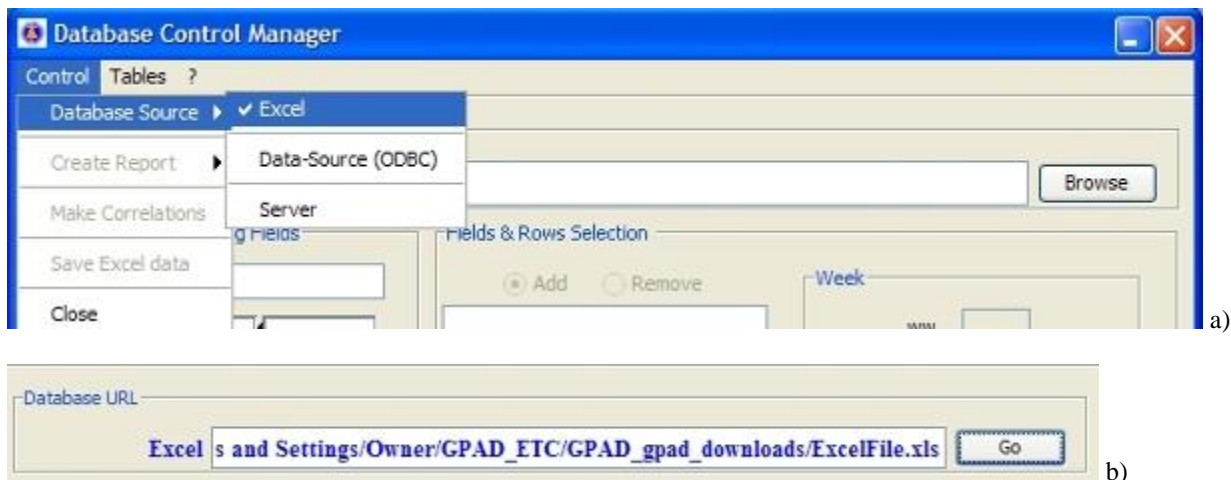


Figure 15: Accessing Excel file: Excel selection (a) and typical full path to file (b).

3.2.4 EXCEL Files

To access Excel files:

- Select “**Control**”, “**Database Server**” and “**Excel**” (Figure 15a), the URL field is now set to “**Excel**” as shown in Figure 15b.
- Then click on “**Browse**” button. Or enter the file name with full path as supported by the operating system and hit “**Enter**”. If “**Browse**” is used, a file-chooser dialog pops-up
- Browse the file system and select the Excel file you want to load. The path is displayed in Link/URL text field (Figure 15b)
- Click on “**Go**” or hit “**enter**” to load Excel file

- The list is populated with Excel file “**table sheets**”
- Select a table sheet. Or use the auto-fill to find a table sheet
- A counter window pops-up showing the number of fields found in the table sheet. The fields and corresponding data type “[type]” are displayed in “**Tables & Corresponding Fields**” list.

3.2.5 Save database connection

GPAD users can save a successful database connection. Connection credentials are saved for later use. To save a connection, use “**Save connection**” tab. When “**Save connection**” is called while only database tables are listed, future connection based on this saved connection will result in the display of the database, and its tables. However, if a given table is selected and corresponding fields are displayed, future connection will list all tables then will attempt to select the table and display corresponding fields.

3.2.6 Show saved database connections

To list previously saved connections use “**Show connections**” tab. **Figure 16** shows a typical window listing saved connections. When selecting a connection, the connection parameters are displayed. The parameters include: credentials, full link to database, computer “**IP**” and “**name**” when connection was saved. To establish a connection from the list, select the connection and click on “**Connect**”. Users can set a selected connection as a “**Default**” connection. When opening “**Database Control Manager**” GPAD will check if a default connection exists. If true, GPAD automatically attempts to connect to the database.

For security reasons, if the IP address or computer name, do not match those in the saved connections the connection will not proceed.

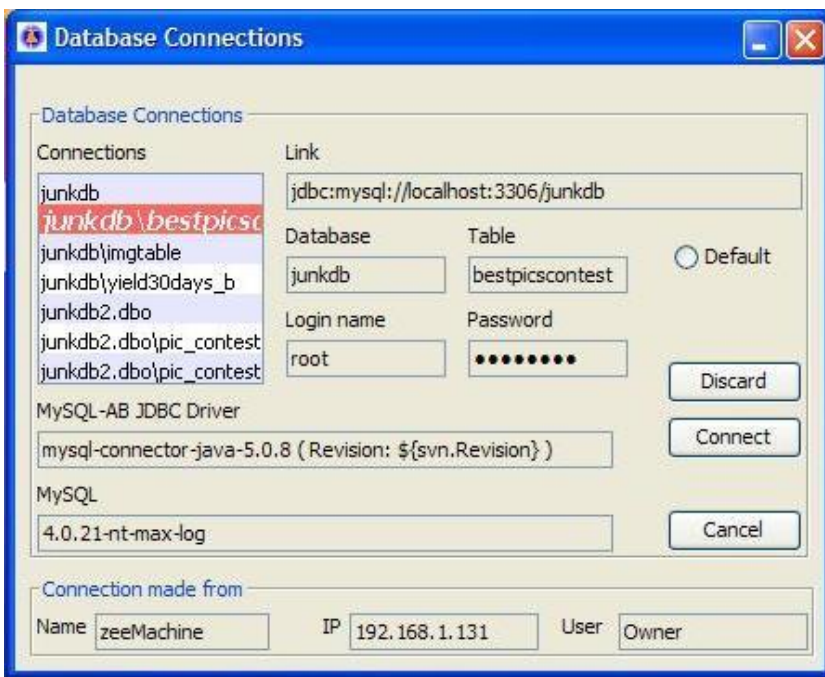


Figure 16: An example of a list of saved database connections. To establish a connection from the list select the connection and click on “Connect” button. To delete a connection from the list, select the connection and press on “Discard” button. When a default connection is selected, the next time “Database manager” is launched a connection to database or table is established automatically.

3.2.7 IP address broadcasting/lookup from GPAD

Users can remotely track their server IP address using “**IP Broadcasting**” integrated in GPAD. Therefore, GPAD must be launched on the computer they plan to access remotely. This feature is especially useful for individuals who remotely connect to a computer without a static IP.

In the remote computer, from GPAD main window (**Figure 17**):

- Select **Environment**

- Then **IP-Broadcast**”

Figure 18 shows broadcasting dialog. Once broadcasting is started, GPAD sends the IP to a database for access from any network. Depending on how often the IP may change if the IP is not static, users can select a frequency that fits their need. Broadcast frequency varies from every 30 minutes to every 6 hours. If “**Always update**” button is checked, broadcasting is started automatically once GPAD is launched. If the computer is part of a network, the IP address stored is that of the modem (IP given by user internet service provider –ISP-). Therefore, users must set adequate “forwarding” in their router to the database application they intend to access.

To get the IP address of the remote computer use “**IP-Lookup**”, as shown in **Figure 17**, in GPAD running in the local computer this time. **Figure 19** shows “**IP-Lookup**” dialog. Remote computer name and GPAD license are needed to fetch IP. Users can also use their browser to fetch the IP.



Figure 17: IP address Broadcasting.

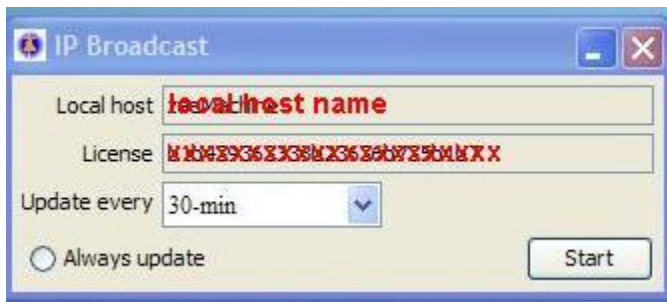


Figure 18: IP-Broadcast dialog. Once broadcasting is started, GPAD sends the IP to a database for later access. When “**Always update**” button is checked, broadcast is started automatically once GPAD is launched. If “**Always update**” radio button is checked, GPAD broadcasts the IP every time it is launched.

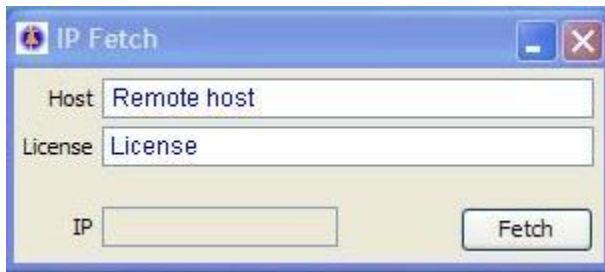


Figure 19: Fetching IP of a remote host.



Figure 20: Fetching a remote IP address using a browser. In the browser link window enter “<http://www.tekinsil.com/gpadUsersCtrl/getMyIP.html>”to display this dialog.

3.2.8 IP address lookup from a browser

Use this link <http://www.tekinsil.com/gpadUsersCtrl/getMyIP.html> to fetch IP address of a remote computer/server. **Figure 20** shows the dialog on the browser. Enter IP address and license, and click on “**Get IP**”. If address exists in database it will be displayed. User can also type directly “<http://www.tekinsil.com/gpadUsersCtrl/getHostIP.php?Host=myRemoteHostName&License=myRemoteHostLicense>”.

3.3 Tables

Creating, updating and other tables’ manipulations are executed from “Tables” menu (**Figure 21**).

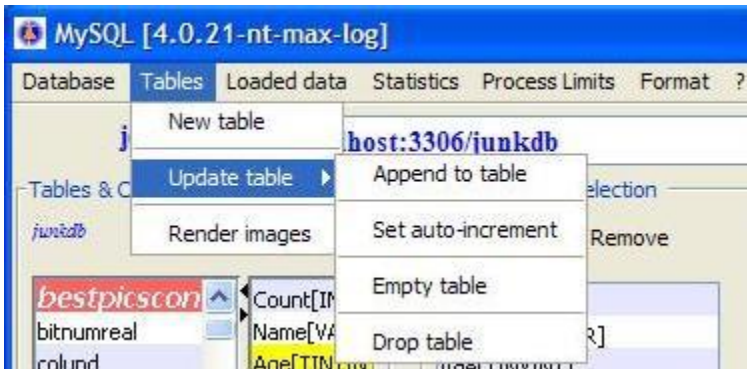


Figure 21: Tables menu.

3.3.1 New table

GPAD makes it easy to create tables in any supported database:

- From “Tables” in “Database Control Manager” select “New Table”
- Fill the new table dialog and click on “Create Table” button (**Figure 22**)
- Specify the table fields properties as shown in **Figure 23**.

3.3.2 Update table

- “**Appending to table**”: to append data to a table. The table must be selected in “Tables & Fields” lists. **Figure 24** shows a typical “appending dialog”. Fill the rows with data. A new row is added automatically when a row is filled, and cells of the new row are “pre-filled” with table defaults. Data integrity is checked during the fill process of the dialog. For help on columns properties double-click on table columns headers to display columns properties (**Figure 25**). When ready, select “Update” then “Append data”. Data integrity is also checked before making any database connection. If a column is an image column or the file is an image file, the image is displayed for confirmation. If file is not an image, however, file type icon is displayed instead.
- “**Set auto-increment**” to set stored table increment column value to a different value
- “**Empty table**” to delete existing data in tables. The process is not reversible.
- “**Drop table**” to eliminate a table from database. The process is not reversible



Figure 22: Creating a new database table. For example, table “myNewTable”, has six columns/fields once created.

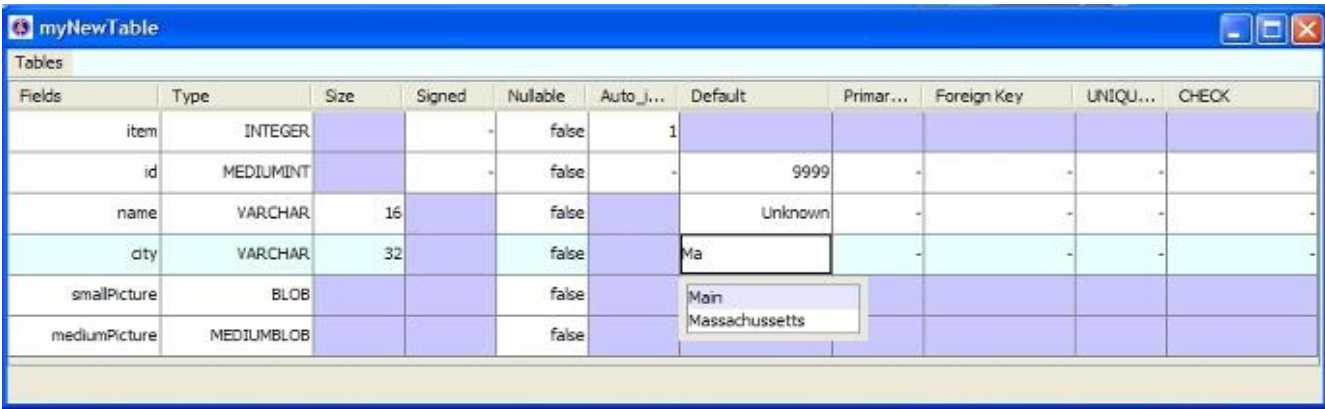


Figure 23: Typical new table dialog window with MySQL database. Default word/numbers are saved for future auto-fill process.

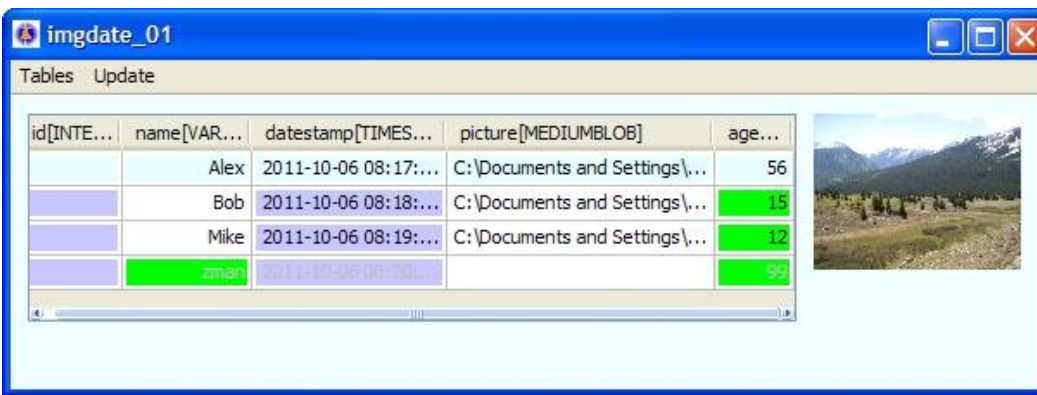


Figure 24: Appending to tables “imgdate_01”. Double-click on headers to display fields’ properties (Figure 25).

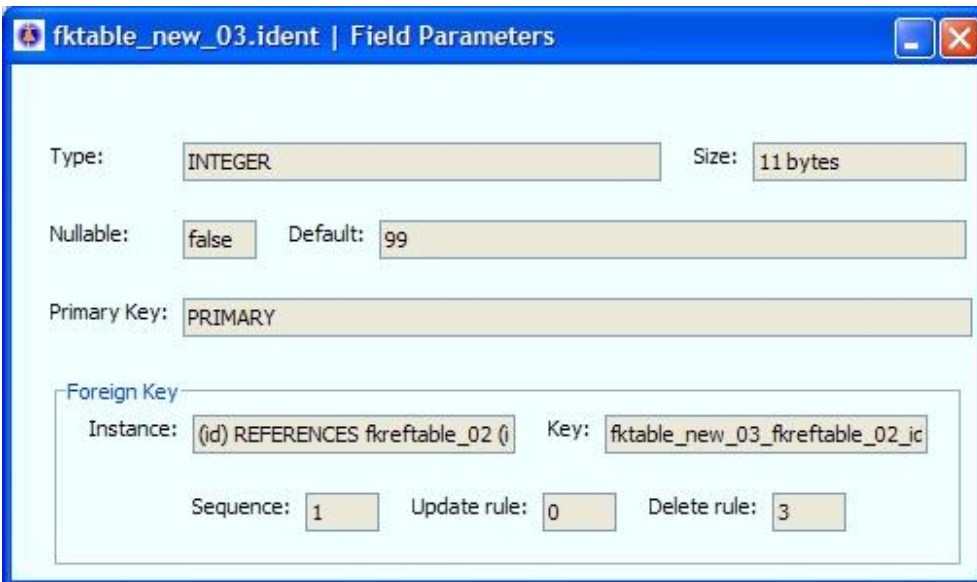


Figure 25: Table parameters and dependencies.

3.3.3 Render images

If a column in a table holds images data, images can be displayed and rendered. **Figure 26** shows a rendering window. To start rendering images from database table:

- Select “**Table**” from “Database Control Manager”
- Select “**Render**”. Render viewer window is displayed
- Start the render. One can select the column to “**render by**”. The default is the first string or number column in the table
- If table has several image columns, select the column. The default image column is the first image column in the table

If no “**clauses**” are specified, the render process scans every row in the table. However, users have the option to define clauses in “**Specific queries**” text field (see “Error! Reference source not found. Error! Reference source not found.”). If tables have date or time amps users can specify date in “Dates/Timestamps” fields (see “Error! Reference source not found. Error! Reference source not found.”). During rendering, the “**render by**” value is displayed in the render window title bar. If an image or render-by is empty (no entry), a dialog prompts for update pops-up.

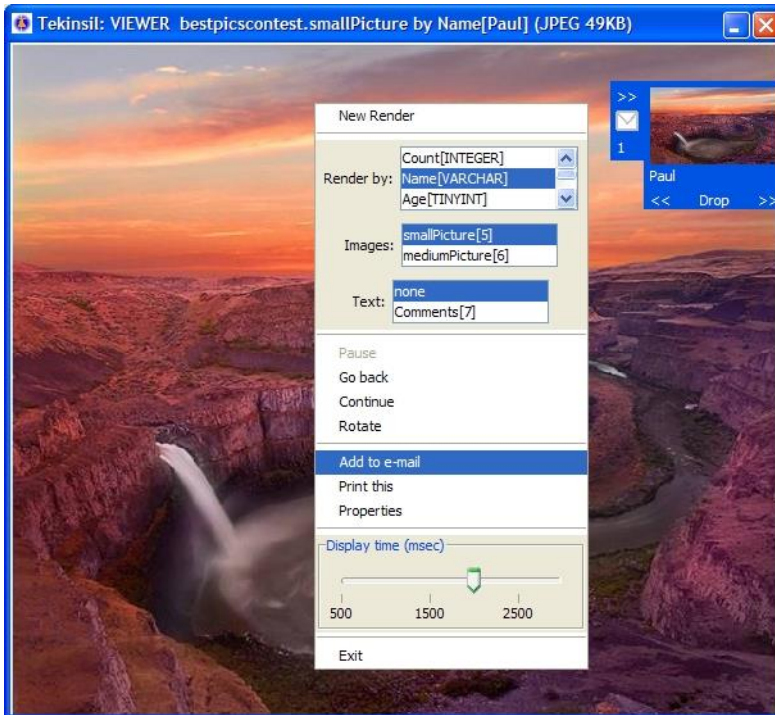


Figure 26: Rendering images from database. Three render options are available: (1) Render by column, (2) Image column if several image columns exist in table, and (3) Text columns if one or several columns have text data.

Functions in the render feature include:

- **Pause/Continue:** to pause or resume rendering. Pausing allows going back to review images, print or e-mail the image being displayed. To resume rendering, select “**Continue**” tab
- **Go back:** once rendering is started, previous images can be reviewed by pausing first, then click on “**Go back**”. To resume rendering, select “**Continue**” tab
- **Rotate:** to rotate image clockwise. A single rotation is 90-degrees with respect to previous position.
- **E-mail this:** to select currently displayed image to be sent by e-mail. If this image is the first selection “**E-mail manager**” tab as shown in **Figure 27** appears with a thumbnail image corresponding to the image to send. “**E-mail manager**” keeps track of the images to be sent. The name of the image file would be the “**render by**” column. The image count is displayed below the e-mail sign. To review images press on “>>” for next image to be sent or “<<” for previous image to be sent. To cancel a specific image, ie. not sending, click on “**Drop**” while thumbnail is displayed. To show or retract “E-mail manager” click on the sign “>>” on the top-left corner of the tab. Click on the thumbnail image to review images to be sent in the main window. To see an image to be sent in larger size in the render window, click on the image thumbnail. To go back to the database image click again on the thumbnail. The database image is stored locally once a pause is called. If the time elapsed from the time the pause was called exceeds 1 minute, a warning dialog pops up.
- **Print:** to print currently displayed image.
- **Properties:** to display information about the image. The minimum information that image files can have are the coding data. Other information, like “**Exif**”, can be embedded in the file (see paragraph “**8 JPEG Explorer**”). This information can be basic

such as the image resolution the camera/device used for the image, camera/device make and model. Or advanced information such as GPS, etc. **Figure 28** shows a typical image properties window. At first, basic properties are displayed. For advanced properties the list can be extended by using “**Extended**” button.

- **Display time/Render speed:** to adjust rendering speed by setting the slider position “**Display Time**” as shown in **Figure 26**. The settle time is in milli-seconds (msec). Longer times are for slow rendering, while shorter times are for fast rendering.



Figure 27: E-mail manager tab. The render-by value is “Paul”. Click on “>>” under mail sign to dock e-mail manager. To review images to send use “<<” to go to previous and “>>” to go to next image. To remove an image click on “Drop”. To see an image in larger size, click on the image thumbnail (image will be displayed in main render window). To go back to database image, click again on the thumbnail.

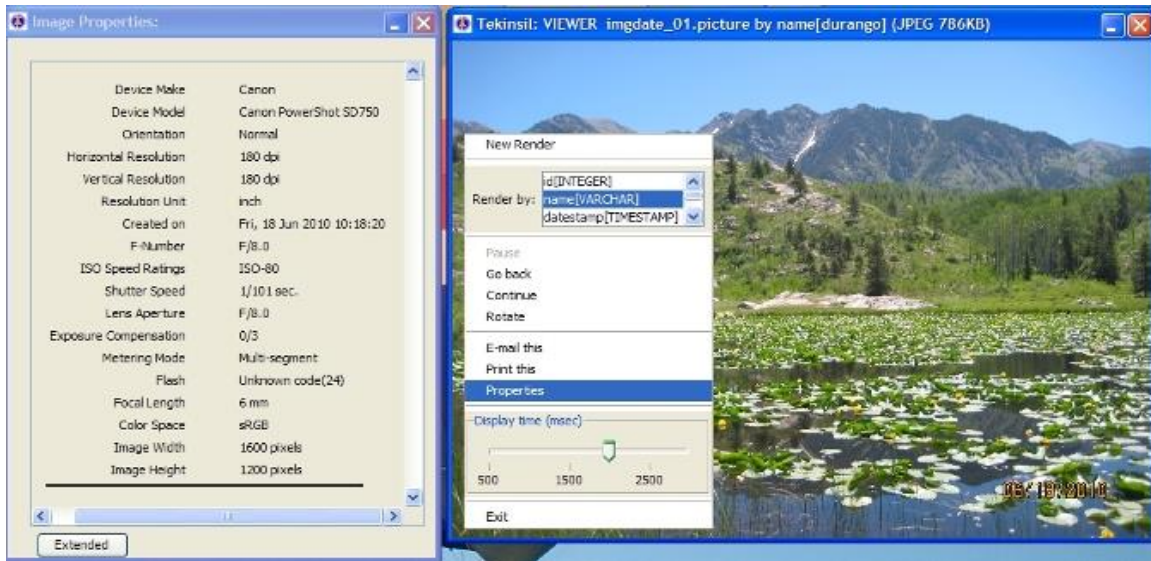


Figure 28: Image render window (right) and image properties embedded in image file (left).

3.3.3.1 Update table

While rendering images in table, users can pause the rendering and update or delete the row.

- “**Updating database table rows**” to update current row. Render must be paused. With the right mouse button select “**Update table**” (**Figure 29**). **Figure 30** show update dialog. Select a column to update. For columns with image content, a file menu is displayed. When a new image is selected from the file menu, the image is displayed ensuring the right image file for the update (**Figure 31**). To zoom in or out, just click on the image. If the selected file is not an image, an icon corresponding to the data in the file is displayed. If the column is text, a text editor is displayed showing current content (**Figure 32**).
- “**Delete this row**” to delete current row. When row is deleted the process is not reversible.

When rendering, if no image data is available in the cell (null cell), the render process is automatically paused, and the user is prompted for updating the cell.

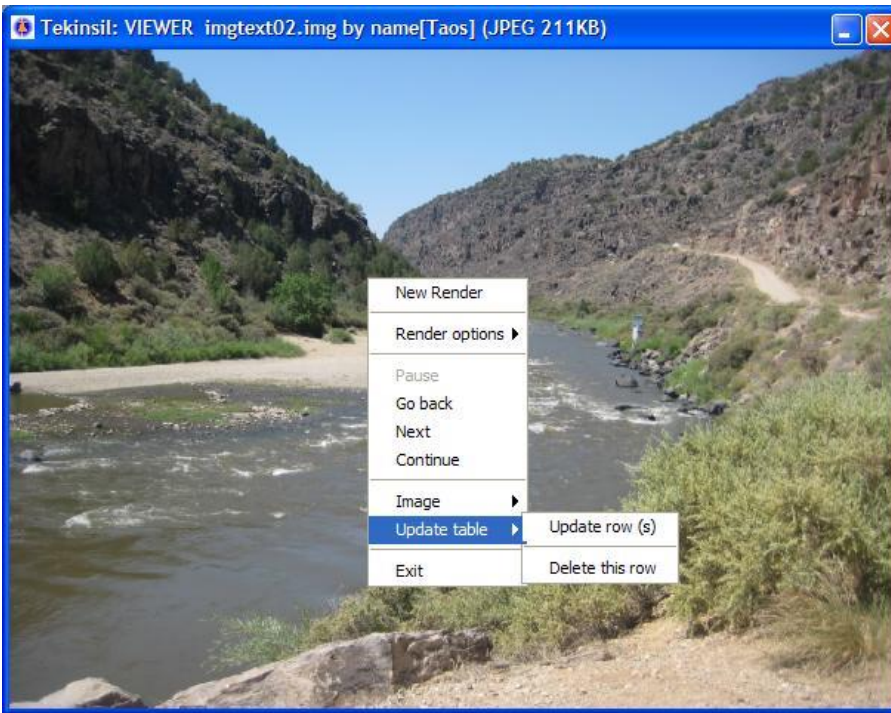


Figure 29: Table update menu.

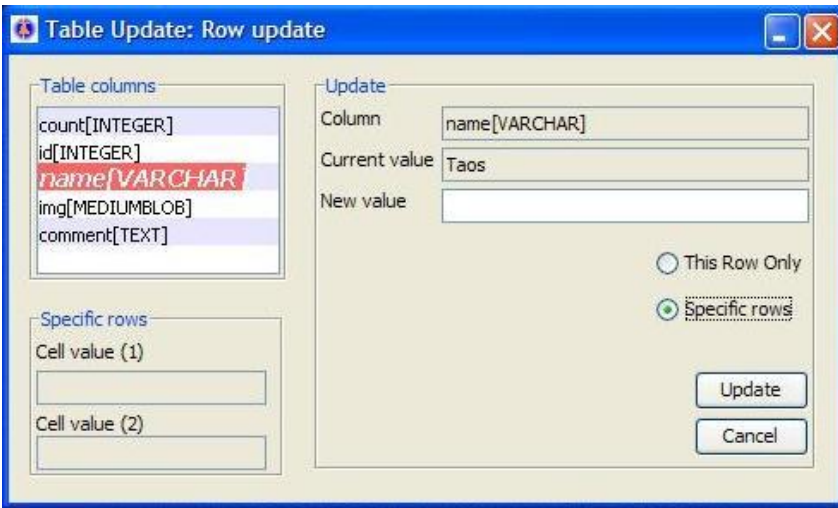


Figure 30: Update window. Update can be applied to current row (where the render paused), or specific rows. For specific rows use “Specific rows” panel to specify rows where update is applicable.

3.3.4 Updating images while rendering

To update images in database tables, by an existing image in the local computer folder:

- Pause the render
- Once database “Image renderer” is paused, open file system “Image renderer” from file system (see “5 Image rendering from file system”)
- From file system “Image render” locate the new image
- Click on the image to create a thumbnail view of the new image. Then drag thumbnail image to the database “Image render” window.

3.3.5 Saving database image to user computer

Reciprocally, a database image can be saved to a directory in user's computer. This time the thumbnail view is created from the database "Image render". Thumbnail image is then dragged from database "Image renderer" window to file system "Image renderer" window. File system "Image render" must point to the directory the user wants the image to go to.

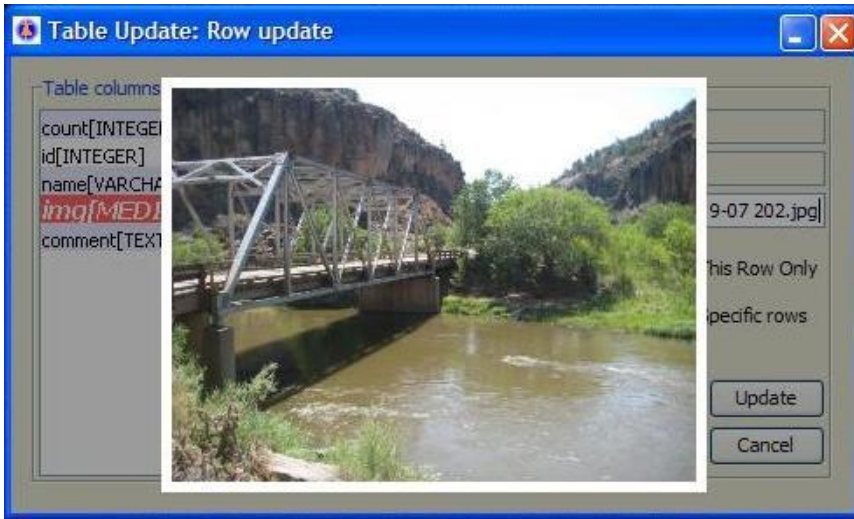


Figure 31: Image column update in database table. Image displayed represents the image that will replace current image data in table. Click on image zoom in and zoom-out.

Figure 33 illustrates an image update process in progress from file system "Image render" window.



Figure 32: Text column update in database table. The utility includes a text editor. The text editor provides "font size", a button "File" for displaying the content of a file in user's hard drive, the "Update" button to initiate update process, and "X" button for closing the text editor.

3.3.6 Embedded GPS data in JPEG Images

At pausing, if the image file is a JPEG format that includes "Exif" data with GPS latitude/longitude coordinates, the coordinates and corresponding physical address are displayed in Figure 34. Currently online "Google Maps" is used to determine this address. Internet connection is required for this feature. To show this address on a map, click on the address string. User default browser opens up with Google map showing the address.



Figure 33: When rendering images from a file system, images can seamlessly be used to update database image by clicking on the file system render image to initiate the process and create a thumbnail. Then drag the thumbnail to database render window. Reciprocally an image from database can be saved to user's computer.



Figure 34: GPS information embedded in the image file translated to actual address using Google Maps.

3.4 Format

Numbers and Date formats are stored to be used for analysis and making reports. To specify the format select “**Format**” tab as shown in Figure 35.

3.5 Loading data

Connection process to database is described in paragraph “3.2 Database connections”. So far a connection to the database is established and all the fields in selected table are displayed as shown in Figure 36. Next, is an explanation on how to load data.



Figure 35: Numbers and Date format menu.

3.5.1 Fields selection and data loading

To avoid loading un-necessary columns/fields that increase query data size, users can load fields of interest only. Select from “**Tables & Corresponding Fields**” the fields of interest (**Figure 37**), then click on “Load” button to load the data. The fields are loaded and ready for analysis. Only fields with “number types” can be plotted. So far no time or special query with clauses is requested. This can be memory and CPU consuming process. Therefore, a maximum default row number is used to prevent loading all the rows in the table. This default is 1000 rows, and can be adjusted to users need. Specific queries with clause should be used to load “**specific rows**” and limit the size of data.



Figure 36: Tables in database “junkdb“, and all the fields of the selected table “residentstable”, for example.

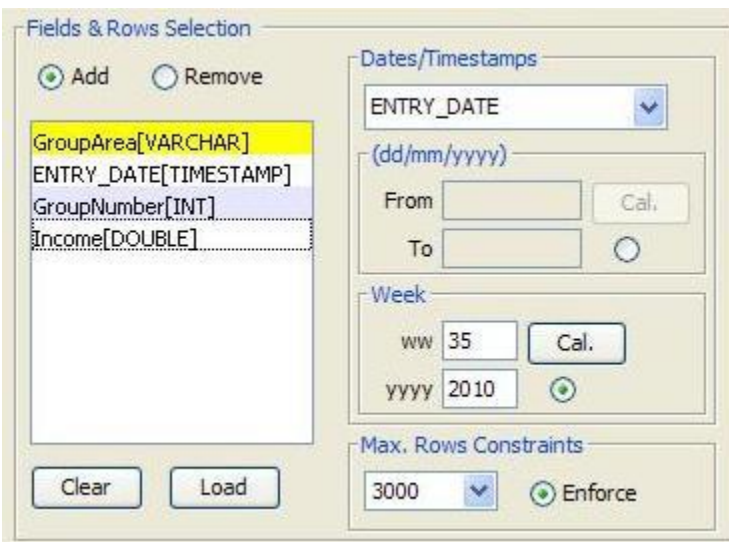


Figure 37: Selected fields to query. Users can also specify the week “Week” or date (dd/mm/yyyy) if needed.



Figure 38: Queries with date (a) and week (b) clauses. Users can use the calendar “Cal” to specify the dates or the week. The first week in calendar starts on the first “Sunday” of the year.

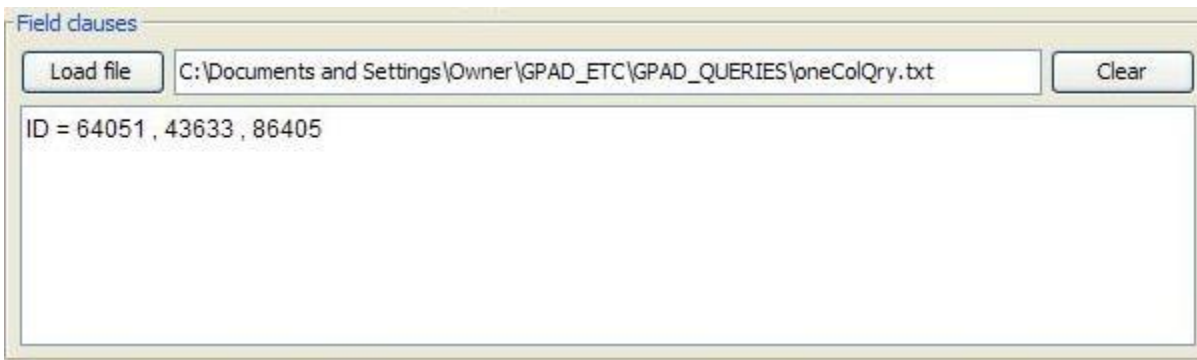


Figure 39: Single column query. Query operators supported are “=, >, >=, <, <=, <>”. If more than one clause value is used commas “,” are used to separate the clause values.

3.5.2 Date-Timeframe and Weekly clause query

Figure 38 shows weekly or date clauses.

- Click on “**Week**” radio button in Week panel or “**From-to**” radio in “**dd/mm/yyyy**” panel
- If “**Week**” is selected, enter the week and year. For example week “**49**” and year “**2005**”. If date is selected enter “**From-To**” timeframe. From example from “**1/06/2005**” to “**31/12/2005**”. A calendar can also be used to assist with this process.
- To load data click on “**Load button**”

3.5.3 Clause columns query

The “**Database Control Manager**” features a text editor to create “**a specific query**” clauses. Below is an example of a database table with columns “**ID**” and “**ProductName**”.

- Query with single column “**ID**” clause for example (Figure 39). Use “**=**” to separate the field/column “**ZIP_CODE**” from its values. The values are also separated by “**,**”. Use as many rows as needed for the query.
- Query with single columns and “**Aliases**” (Figure 40). The word “**Alias**” can be any word but consistent in every row. Alias statement is separated from primary/secondary statement by “**;**”.

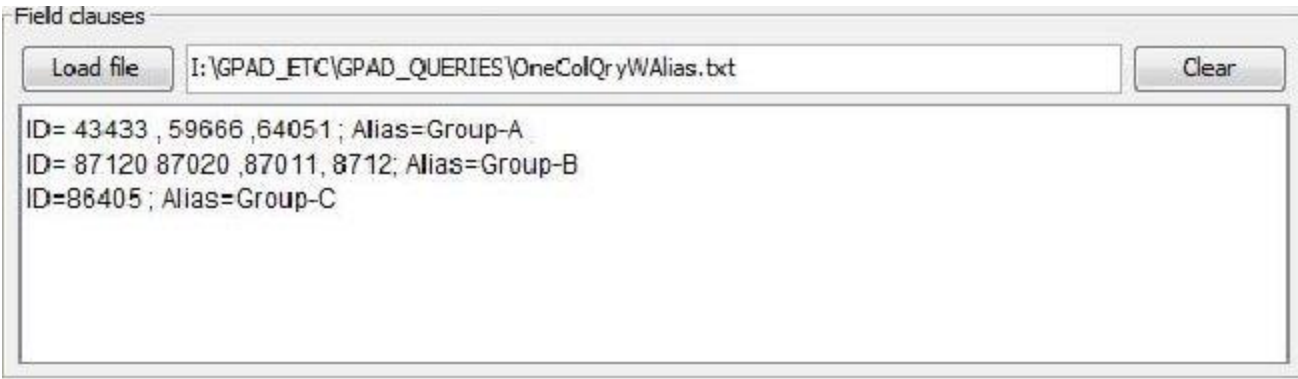


Figure 40: Single clause-column query with “alias”. Alias statement is separated from query statement using semicolon “;”

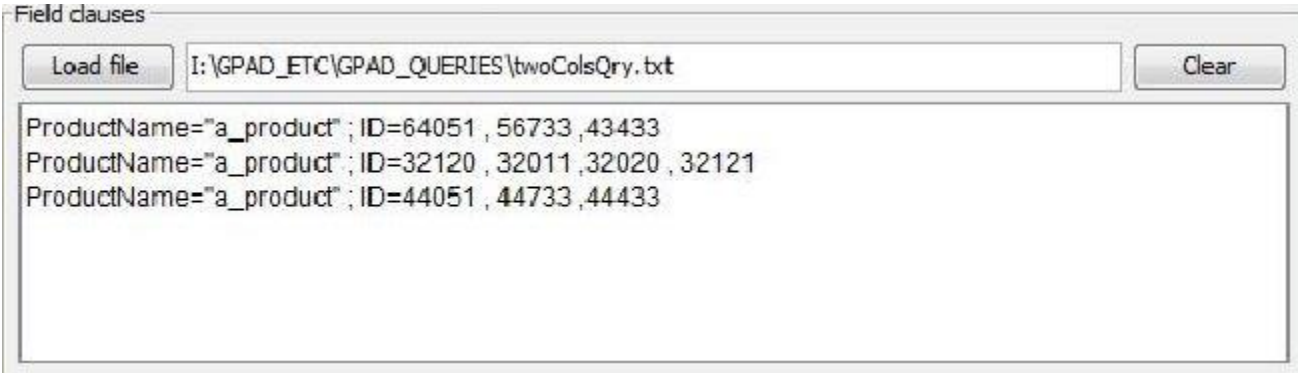


Figure 41: Two clause-columns query. The primary column is “ProductName” with query values between double quote (can also use single quote). The query secondary column is “ID”. If the clause values in the secondary column are numbers no quotes are necessary. When quotes are used for text clauses the same is clause is used, no mix of single and double clauses.

- Query with two columns clause. For example “**ProductName**” for first column (primary) and “**ID**” for second column (secondary) as shown in **Figure 41**. Only one primary column value per row is allowed. Use as many values as needed for the secondary column. Primary and secondary statements are separated by “;”
- Query with two columns clause and “**Aliases**” (**Figure 42**). The word “**Alias**” can be any word but consistent in every row as shown below. Alias statement is separated from primary /secondary statement by “;”.

3.5.4 Null cells and defaults

During the query process, when GPAD encounters a null in a database cell, default values are used that depend on the column type. Table 1 displays various defaults used in GPAD associated with database table column types.

Type	Defaults in GPAD
Time	"00:00:00"
Year	"1900"
Date	"1900-01-01"
Time stamp	"1900-01-01 00:00:00.0"
Any string type	"9999"
Any number type	"9999"

Table 1: Defaults in GPAD for null cells.

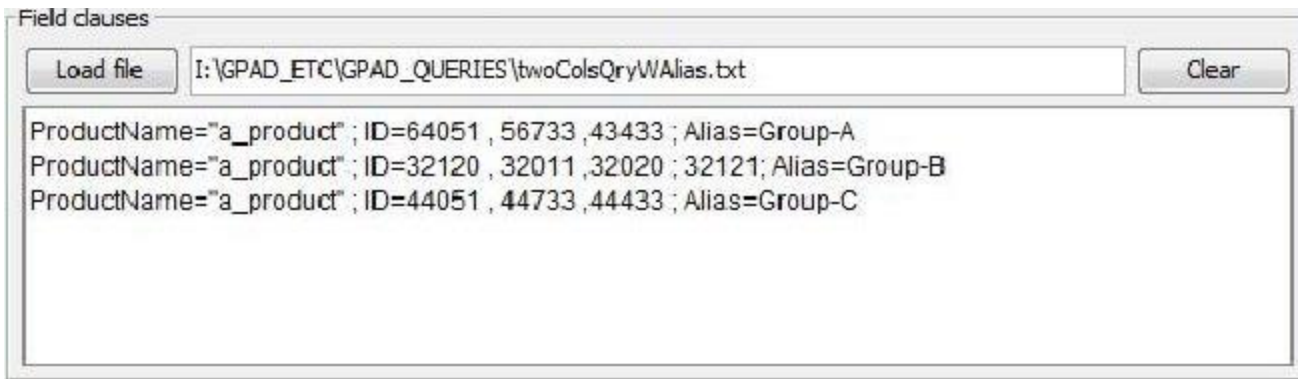


Figure 42: Two clause-columns query with aliases. Statements are separated with semicolons. Text clause values are delimited with single or double quotes. No quotes for number clauses.

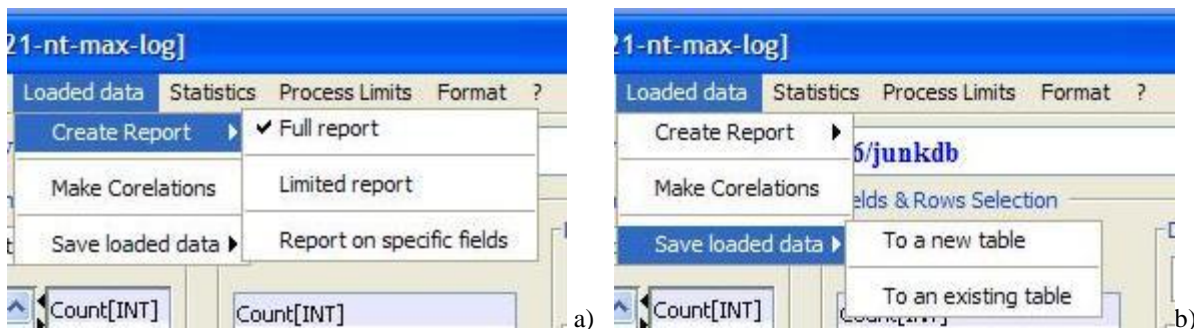


Figure 43: Query data menu. Once data is loaded from database, one can make reports in html format, make correlation plots between various columns, or save/append data in another database or Microsoft ACCESS table.

3.6 Query data

Once data is loaded, users can analyze, plot data, make reports. Figure 43 shows “Loaded Data” menu.

3.6.1 Create Reports

Data analysis of large database tables can be time consuming. A reporting feature is implemented in GPAD to enhance productivity. This feature consists of creating a table in HTML format, along with supporting plot images in “JPEG” format. The table includes several columns: “Splits” column, “Mean” column, “Standard deviation” column, and “Relative Standard Deviation %RSD (Standard deviation/Mean ratio)”, Yield, Cp and Cpk (see paragraph “3.6.1.4 Statistics” for more details). The folder containing report files and images are placed in “gpad_output” folder.

Three reports can be created:

- “**Full report**”: reporting on all the table fields that can be plotted (i.e. number types); fields that cannot be plotted are skipped. Columns data with number type (double float, integer, etc.) are plotted. The others are ignored.
- “**Limited report**”: reporting on table fields starting from “a specified starting index and ending indices in “Selected Items” list; fields that cannot be plotted are skipped. Figure 44b shows the column index in the lists of columns in Figure 44a.
- “**Selected items’ report**”: reporting on table fields that are individually selected from the “Selected Items” list. Figure 45b shows a list of columns to use for the report. The columns are selected from downloaded data shown in Figure 45a.

3.6.1.1 Full Report

To create a full report:

- From “**Loaded data**” menu select “**Create report**”, then “**Full Report**”
- A confirmation dialog pops-up. If continue with “**Full Report**” is elected, a reporting procedure window pops-up
- Select the reporting procedure type: “**Background**” (the plots are rendered in the background), or “**Foreground**” (the plots are rendered in the foreground)

- A dialog asking for split pops-up. Select the split name or “none” for no split
- Reporting process starts and the default statistic items are computed. See “3.6.1.4 Statistics” to set the list of statistic items.

3.6.1.2 Limited Report

To create a limited report:

- From “Control” menu select “Limited Report”
- The ”Control Panel” window expands and displays the “Limited Report” panel as shown in Figure 44b
- Select the starting and ending items to report from “Fields and Rows Selection” list
- Click on “Go” if ready or clear to change the starting or ending items
- Continue the process as in “Full Report”

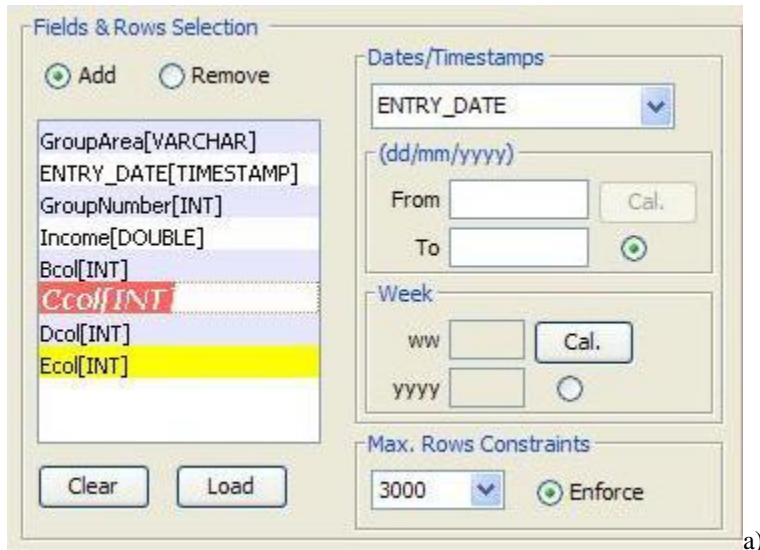


Figure 44: Making a limited report. Loaded fields list (a) and “From–To” fields indexes to report (b). In this example index “3” corresponds to column “Income”, and “5” corresponds to “Ccol”. Therefore only “Income”, “Bcol” and “Ccol” are used in the limited report.

Limited and Selected Item Reports procedures are useful to exclude those fields that are not relevant and prevent another data loading from the database. In any case, only fields with number-types are reported.

To hide the “Limited Report” panel:

- Click on ”Clear” button
- A dialog pops-up asking for hiding panel
- If yes is selected the panel is hidden and the “Control Panel” retracts

3.6.1.3 Report on “Selected Items”

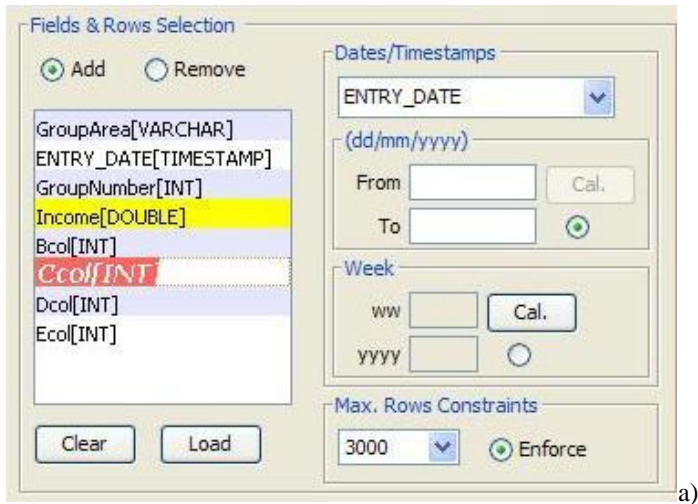
Figure 45 shows how to create a report on selected items only:

- From “Control” select “Selected Item”
- The “Database Control Manager” window expands and displays the “Selection Items” panel (Figure 45b)

- Click on “**Fields and Rows Selection**” list to select the items
- Add and remove fields as needed
- Click on “**Go**” if ready, or clear the list. Continue as in “**Full Report**”

To hide the “Selected Item” panel:

- Click on “**Clear**” button
- A dialog pops-up asking for confirmation to hide panel
- If yes is selected the panel is hidden and the “**Database Control Manager**” retracts



a)



b)

Figure 45: Creating a report on selected items. Fields loaded (a) and Specific fields to report (b).

3.6.1.4 Statistics

When making reports, by default “**Mean**” and **Standard Deviation** “**Sigma**” are computed and displayed. However other statistics such as: “**Median**”, “**Sum**”, “**Yield**”, “**%RSD**”, “**Occurrence**” and **Process Capability** (“**Cp**”, “**Cpk**”) can be computed as well. To select the statistics items go to “**Database Control Manager**” select “**Statistics**” then “**Stats list**” (Figure 46). Figure 47 shows a dialog window for static items selection.

When plotting data with correlation user can select which column statistics to displayed. **X-Axis** column statistics or **Y-Axis** column statistics. To select which statistics to display go to “**Database Control Manager**” select “**Correlation stats**”.

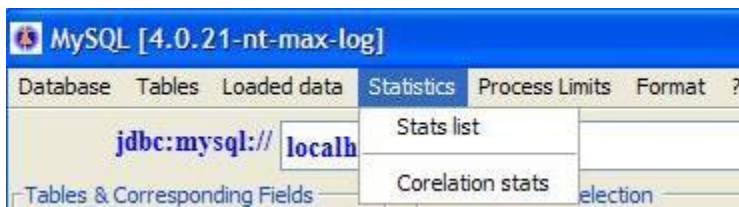


Figure 46: Statistics menu. To set statistics items select “Stats list”. To specify which column statistics are displayed in correlation plot select “Correlation stats”.

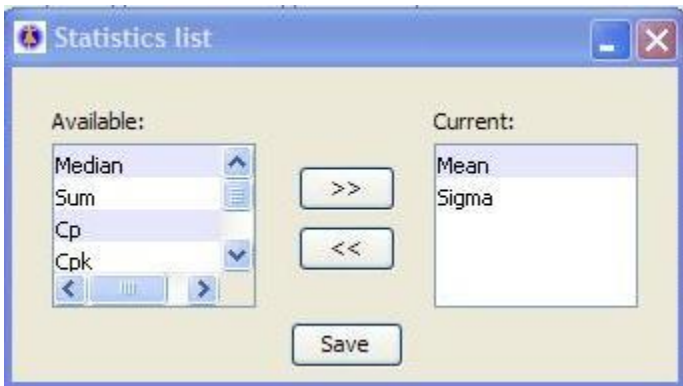


Figure 47: Statistic control manager. Add “>>” or remove “<<” statistics items from lists. When saved items in “Current” list are the ones available when making reports or plotting data with statistics.

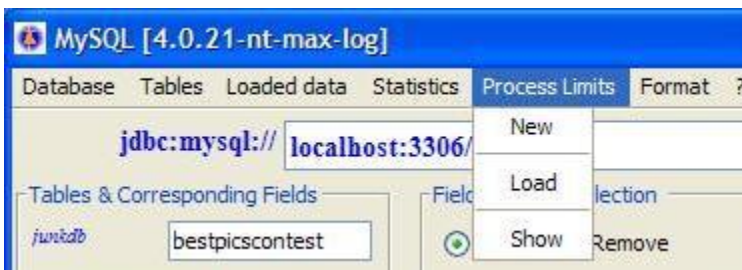


Figure 48: Process limits menu. To create “Process limit” select “New”, to load existing process limit use “Load” and to show the details of loaded process limit select “Show”.

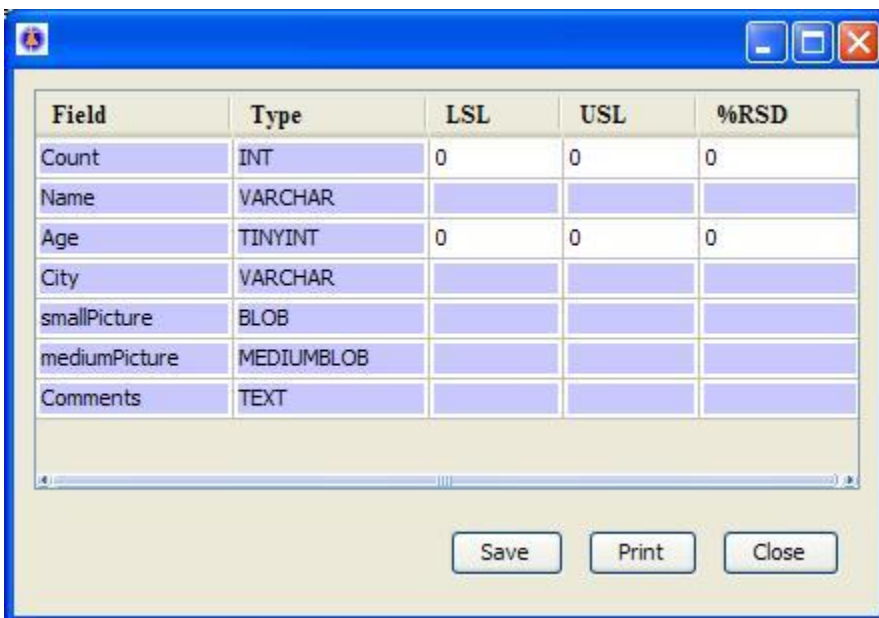


Figure 49: Typical process limit dialog window in MySQL data. Users set fields LSL, USL and %RSD targets. Item values will be used for statistics computations.

3.6.2 Process limits

Statistic parameters such as “Mean”, “Sigma”, and “Median” are computed without additional information outside the raw data loaded from the database. However, computing the “Yield” and Process Capability (“Cp” and “Cpk”) requires “process limits” information. Users must create a file that includes process limit parameters.

- Go to “Database Control Manager” and select “Process limits” (Figure 48)

- Select “**New**” to create a new process limits table. **Figure 49** show a typical process limit window
- Select “**Load**” to load an existing process limits table to be used for statistic. When loading “**process limits**” the table must match the data loaded from the database
- To view and update a process limits table select “**Show**”. The table showed is the one already loaded for use

3.6.3 Make correlation

To make a correlation plot between two columns:

- Select “**Control**” from “Database Control Manager”
- Then select “**Make Correlation**”. The “**Database Control Manager**” expands and shows the “**Correlation Panel**” as shown in **Figure 50b**. From the “**Fields & Rows Selection**” **Figure 50a** select the column to correlate
- Select the columns to correlate from “**Fields & Row Selection**” list as shown in **Figure 50a**.

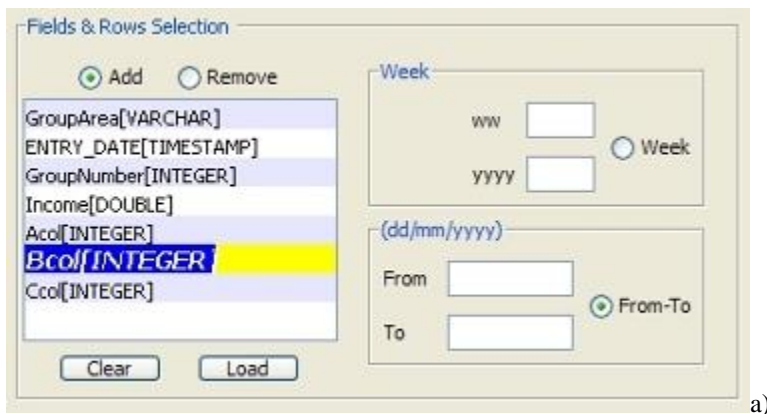
3.6.4 Save loaded data

Cached data from tables in **Microsoft-SQL, MySQL, MariaDB, ACCESS** or **Excel** can be saved to a new table or append to an existing table in **Microsoft-SQL, MySQL, MariaDB** or **ACCESS**.

3.6.4.1 Recording “To a new table”

Once data is loaded select “**Save loaded data**” tab then “**To a new table**” or “**To an existing table**”. A window pops-up asking for server and database name link.

- Enter the link. For example “**localhost:1433;databasename=junkdb**” in SQL-2005 and 2008, or “**localhost:3306/junkdb**” for MySQL. For ACCESS-ODBC use the “**data source**” name. For more information on database link syntax go to “3.2.3Microsoft ACCESS - ODBC Data Source”
- **GPAD** alters data field types to closely much those of the database selected. A dialog with new types is displayed as show by the example in **Figure 51**. The user can still adjust the field types and field names before recording to the database.
- Click on “**Record**” button to initiate the recording process
- Table name dialog pops-up. Enter the table name
- A login dialog is displayed. After authentication, if table name entered already exists in database, a prompt asking for another name is displayed. Finally recording process starts and a progress window is displayed.



a)



b)

Figure 50: Correlation between two table fields: list of loaded fields (a), and fields to correlate (b).

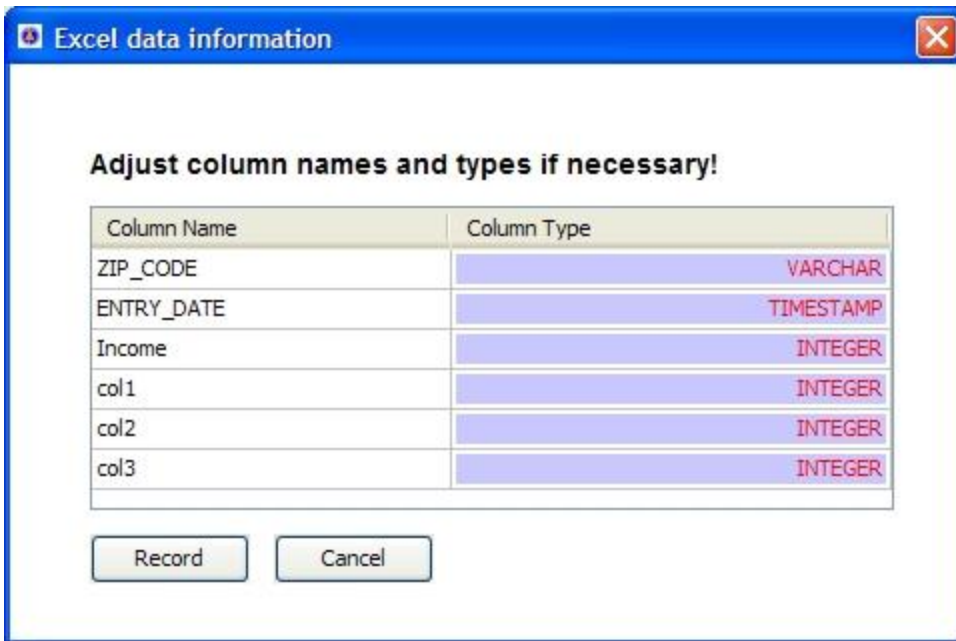


Figure 51: Saving cached data dialog. Column name and type can be adjusted to new table.

3.6.4.2 Recording “To an existing table”

To append cached data to an existing table select “Save loaded data” tab then “To Existing table”:

- A window pops-up asking for server and database name link.
- Enter the link. For example “localhost:1433;databasename=junkdb” in SQL-2005 and 2008, or “localhost:3306/junkdb” for MySQL. For ACCESS-ODBC use the “data source” name. For more information on database link syntax go to “3.2.3 Microsoft ACCESS - ODBC Data Source”
- Table name dialog pops-up. Enter the table name. The table must exist and field types must match those of the in the cached data.
- A login dialog is displayed. After authentication, the recording process starts and a progress window is displayed.

4 Plotting data

Once the data is loaded, one can make plots. Figure 52 shows plot frame components: plot area and corresponding mouse events, table area and navigation throughout the table, x-y scale adjustment, etc. Plot types include percentile distribution or correlation between columns.

4.1 Plotting Percentiles

To plot percentile distribution, double-click on the mouse “left button” while pointing at item in “Fields and Rows Selection” list of the “Database Control Manager”.

4.2 Split data into groups

Once a plot is displayed (Percentile or Correlation) the data can be split into groups. The plot and corresponding statistics are grouped against the split parameter.

- In “Analysis” menu select “Split plot”.
- A dialog encompassing all “possible split parameters” pops-up. Select a split parameter
- After selecting the split parameter the plot is displayed with colors and characters. Each combination of color and character represents a split/group. If the statistics table is displayed the table will show the splits and corresponding statistics.

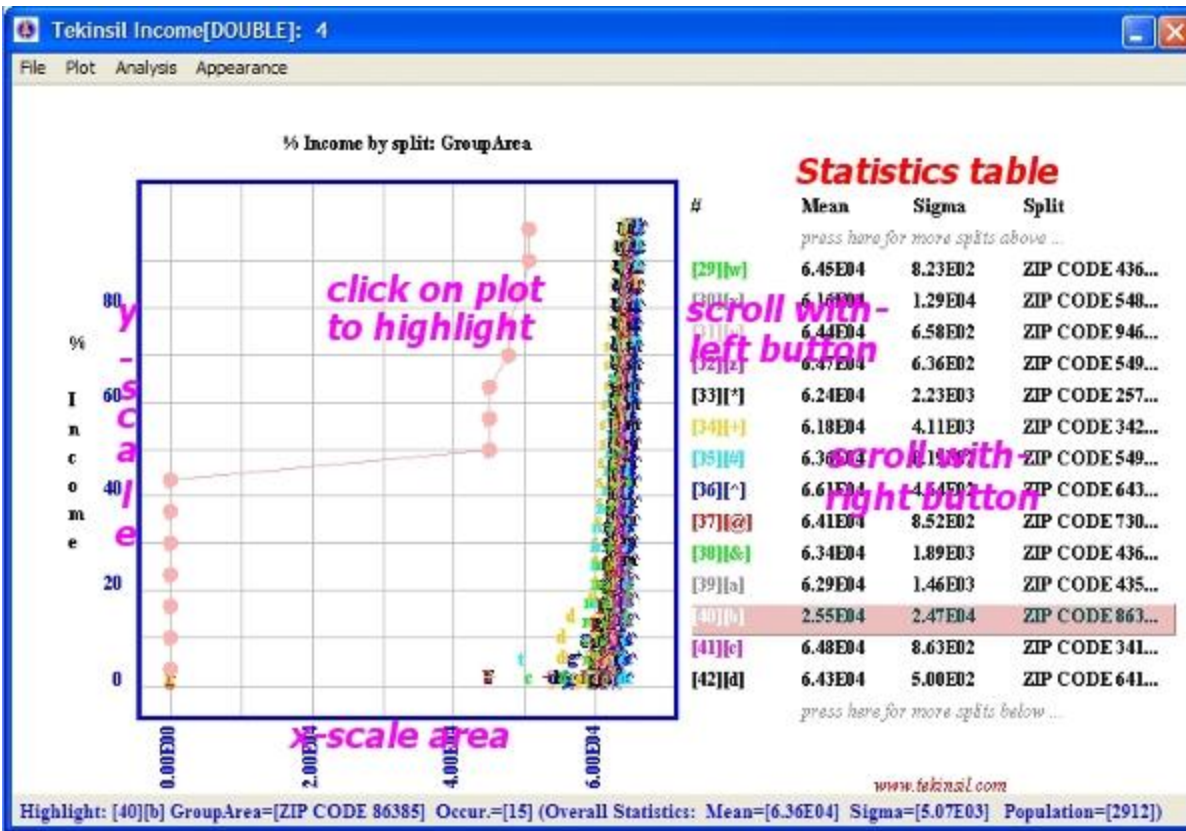


Figure 52: A plot frame showing: plot area and table area, and summary for statistics highlight.

4.3 Navigating the table

Once a split of data into groups is made a table can be displayed adjacently to the plot frame. The table holds statistics of each split/group.

4.4 Scroll the table

Scroll feature enables a large number of rows (groups) to be visible. In the table area, click on the mouse “right button” and drag to scroll the rows. When the split/group counts exceeds the table rows, a message “press here for more splits” above or below the table is displayed as a reminder that more rows are not visible.

4.5 Highlighting Keypads Navigating the table

Once a split of data into groups is made a table can be displayed adjacently to the plot frame. The table holds statistics of each split/group.

4.5.1 Scroll split table

Scroll feature enables large rows to be accessed and made visible. In the table area, click on the mouse “right button” and drag to scroll the rows. When the split/group counts exceeds the table rows, a message “press here for more splits” above or below the table is displayed as a reminder that more rows are not visible.

Keypad can be used to navigate through statistics table rows. **Figure 53** shows keys programmed in GPAD:

- “Home” to go to top row of statistics table
- “End” to go to the last row
- “Page Up/Down” to display one page at a time
- “Arrows” to scroll one row at a time

Ensure the “Num Lock” key is activated in order to use the keys above.



Figure 53: Numeric keypad. To go to first group click on “Home”. To go to last group click “End”. Click on “PgUp” or “PgDn” to show a new page. Up arrow “key 8” and down arrow “key 2” scrolls groups/splits table one row at a time. To locate a “group/split” click on “key-5”

4.5.2 Highlighting a table group and a group plot

- In the area adjacent to the plot area, click on the mouse “left button” for instant highlight
- After this adjacent to the plot area, click on “right button” for persistent highlight of split plot

4.6 Scaling X and Y-axis

- In the lateral area below the X-axis, double-click on the mouse “left button” to display the scale dialog for X-axis
- In the adjacent area to the Y-axis, double-click on “left button” to display the scale dialog for Y-axis

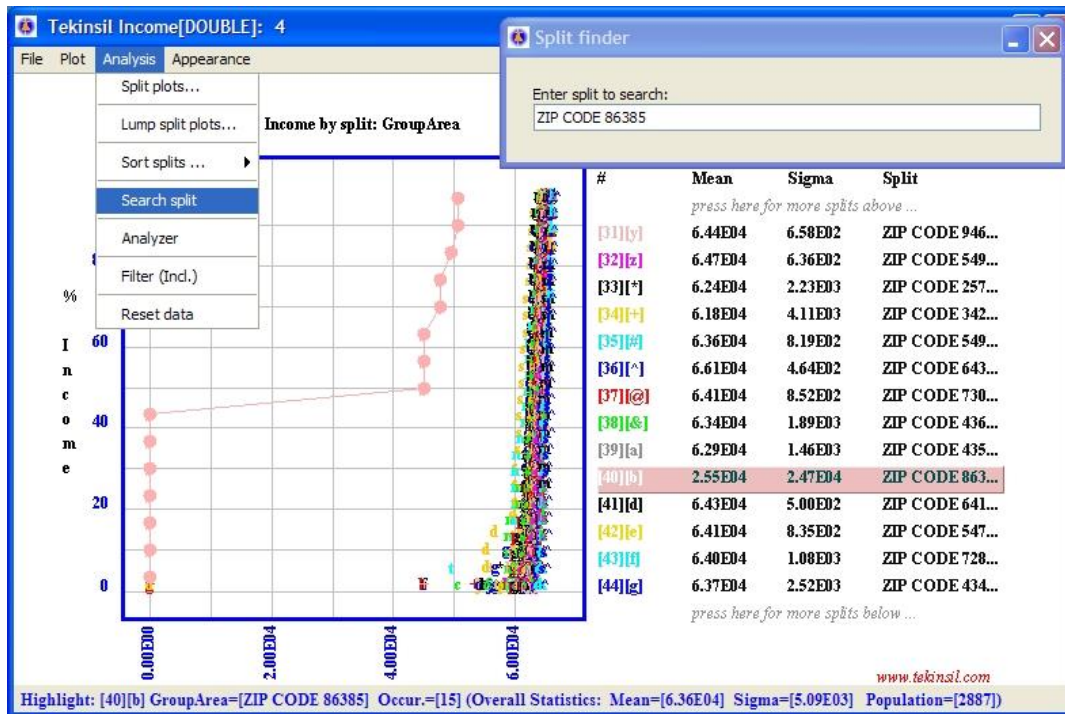


Figure 54: Split data plots with table and split finder dialog.

4.7 Linear/logarithmic scale

Plot can be linear or logarithmic scale.

- To adjust the X-axis scale type, pull down the menu and select linear or logarithmic plot
- To adjust Y-axis scale type, pull down the menu and select type linear or logarithmic

NB: When log scale is used data value **is not converted to logarithmic values**, but shown in logarithmic scale. Data with negative or null values will not be plotted in logarithmic scale.

4.8 Split finder

Click on function key “F5” of the keyboard or clear “key 5” from the numeric keypad (**Figure 53**) to launch the split finder dialog as shown in **Figure 54**. Type the split name in the text field. The split is automatically searched and highlighted when found.

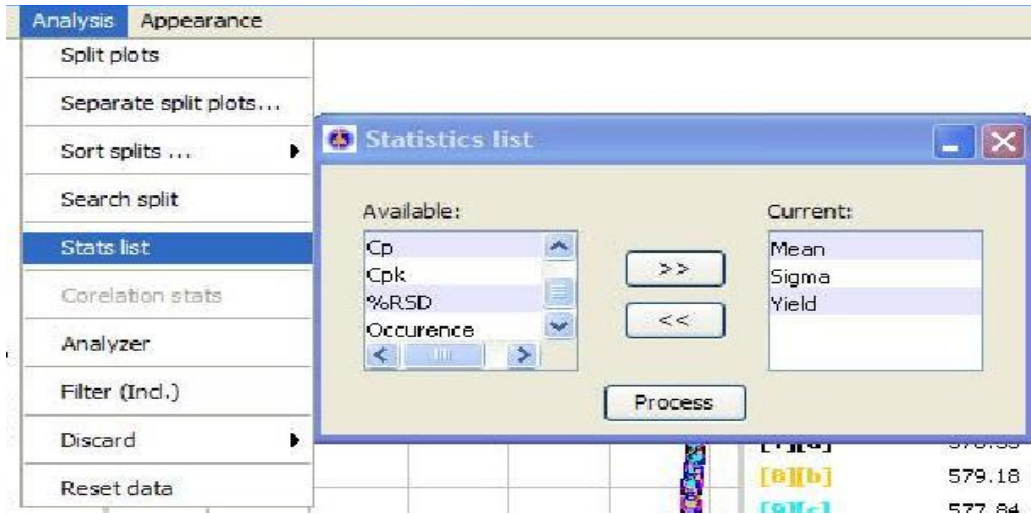


Figure 55: Statistic parameters selection.

4.9 Separation and Lump of splits/group plots

Once data is split, one can also generate distribution plots for each split (Group/Split Separation).

- From “Analysis” select “Separate Splits” to create a plot and percentile distribution for each group
- To lump (stack) the splits, select “Lump split” from “Analysis”.

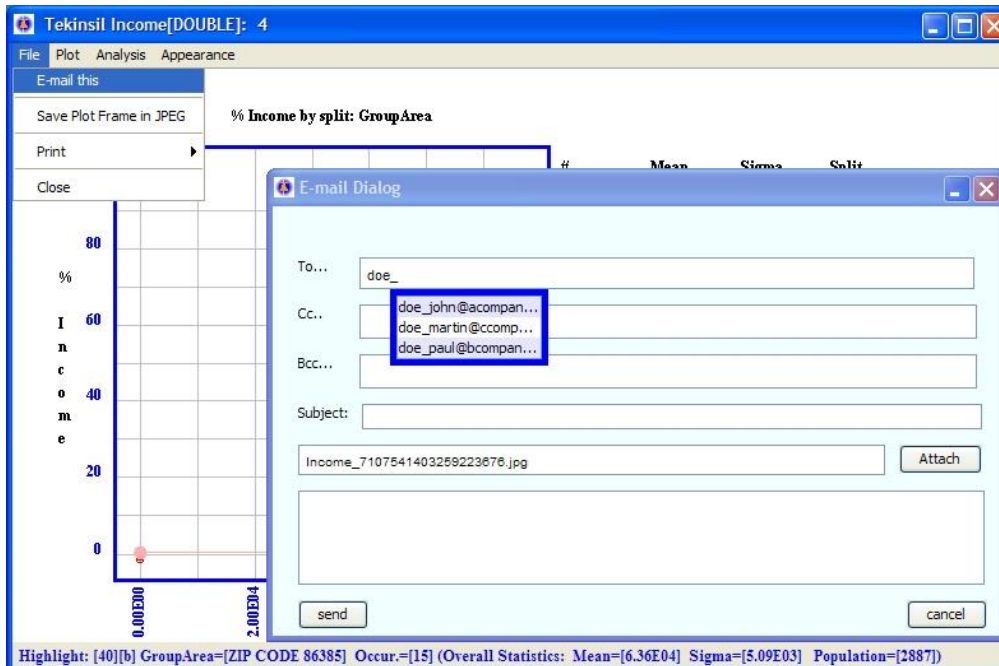


Figure 56: E-mailing plots.

4.10 Statistics parameters in plot table

The default statistic items computed and displayed in plot table are the “Mean” and Standard Deviation “Sigma”. Other statistic items can also be computed. The list includes, “Occurrence”, “Median”, “Sum”, “Sigma-Mean ratio (%RSD)”, Yield and Process Capability (“Cp” and “Cpk”). To set the list of statistics items to be computed select “Analysis” then “Stats list” as shown in Figure 55. The statistic parameters displayed are those shown in “Current” list. Parameters such as “Mean”, “Sigma”, and “Median” are computed without additional information outside the raw data loaded from the database. However computing the “Yield”, “Cp” and “Cpk” requires “process limits” information from the user.

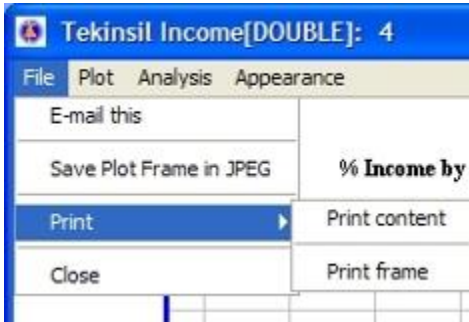


Figure 57: Printing a plot. To print the plot and table area use “Print content”. Use “Print frame” to print the whole frame.

4.11 Save Plot

Use “Save Plot Frame in JPEG” in “File” to make a copy in “JPEG” format. This can also be done by pressing on function “F12” key.

4.12 E-mail a plot

E-mail capability is added to distribute plots as “JPEG attachment”. Figure 56 shows how to send plots using e-mail:

- Form “File” menu in plot window select “E-mail this”
- Image capture process starts followed by e-mail dialog
- In E-mail dialog type the message and add other files if needed.

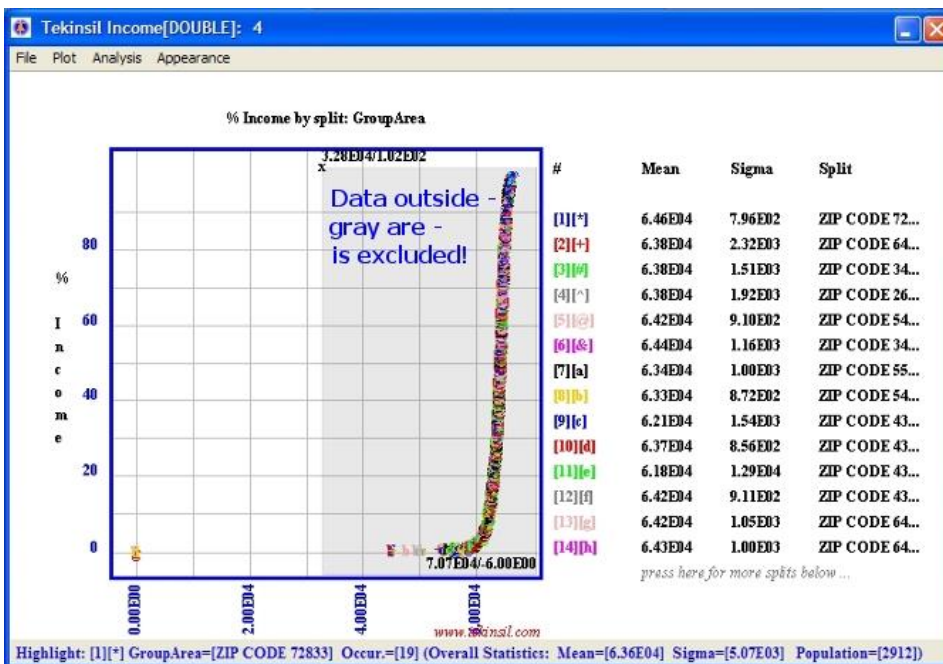


Figure 58: Filtering data process. Only data bounded by the box (gray color in this illustration) is considered.

Today GPAD supports “**Outgoing smtp protocol**” only. E-mail parameters should have been stored in file “**smtp.gpad**” during initial GPAD deployment (see “**GPAD deployment**” paragraph). If this file is missing, e-mail cannot be sent. The file can be generated by selecting “**E-mail**” from GPAD desktop “**Environment**” menu.

4.13 Print

In “**File**” menu select “**Print**” tab as shown in **Figure 57**.

- “**Print content**” prints the frame content (plot and table if available)
- “**Print frame**” to print the whole frame.

4.14 Filtering data

Filtering consists of excluding undesired data. Desired data is plotted, and its corresponding statistics are displayed. **Figure 58** shows how to filter data by selecting only the data to consider:

- Select “**Filter**” from “**Analysis**”
- Click on mouse “**right button**” in the plot area
- Drag mouse. While dragging, a box appears encompassing the data-population desired

Once the mouse is released, only the population bounded by the box is considered. A new plot is made and statistics are recomputed.

4.15 Analyzer

The “**Analyzer**” utility provides a fast approach to analyze the effect of one or several groups/splits on the overall statistics. **Figure 59** shows the “**Analyzer**” utility window:

- Groups or splits can be added “**>>**” or removed “**<<**” from data population.
- A group can be searched, “**added**” or “**removed**” in the “**Analysis window**”
- Click on group/split in table to add to the analysis
- Once these groups are added or removed click on “**Process**” button to display group plots of data considered, display corresponding statistics and overall statistics of data considered
- “**Reset**” button in “**Analyzer**” window resets the data population to the original population when loaded (no rejects).

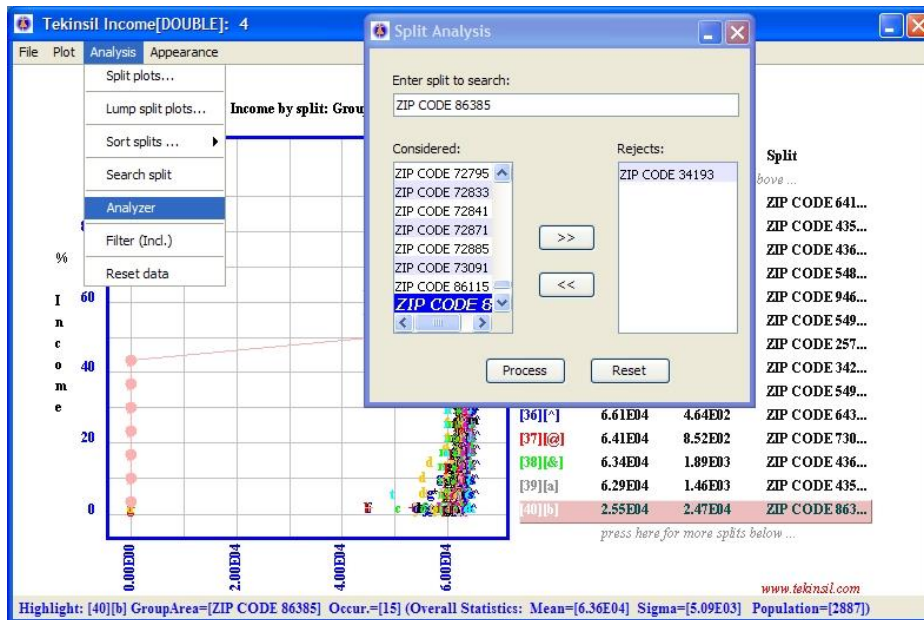


Figure 59: Analyzer utility displayed on top of plot window. Reject (“>>”) or consider splits (“<<”) and click on “Process” to display plots considered, corresponding statistics and overall data statistics.

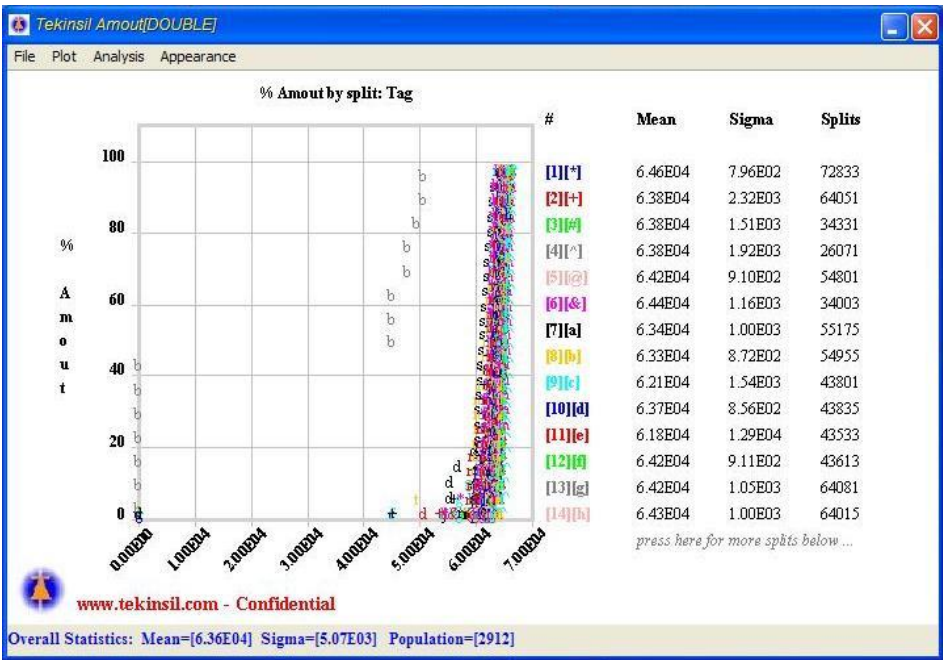


Figure 60: Proprietary-confidentiality added to plot.

4.16 Proprietary and confidentiality

Proprietary and confidentiality statements can be added to a plot as shown in **Figure 60**. To set Proprietary and confidentiality, from **Database Control Manager** select “Plot” then item “Proprietary-Confidentiality” as shown in **Figure 61a**. **Figure 61b** shows “Proprietary-Confidentiality” dialog. Today, only JPEG, GIF and PNG formats are supported. The icon is displayed at 40x40 pixels in the plot frame depending on the aspect ratio. If the original icon image exceeds 120 pixels in the height or width, GPAD downsizes the image to 120 pixels, also depending on the aspect ratio, for quick loading and displaying the icon in the plot area.

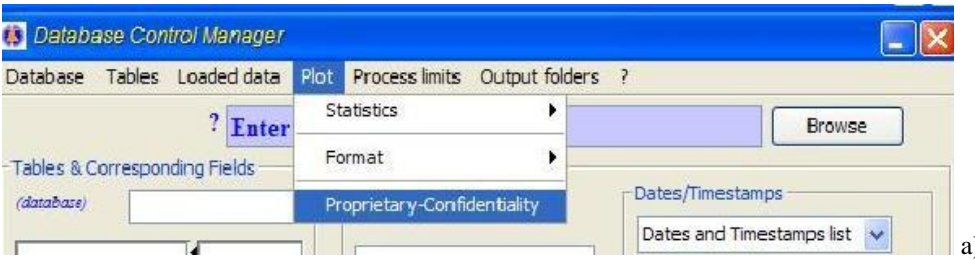


Figure 61: Setting Proprietary and confidentiality: launching dialog (a) and dialog (b).

5 Image rendering from file system

Images in user computer directories can be rendered by GPAD.

- To launch image rendering utility select “Images” menu then “Render Images”
- The render application is launched and a window appears

- Click on mouse “right button” to display the “pop-up” menu
- Select ”New Render“
- A file chooser dialog opens-up
- Browse the file chooser and select the directory/folder where the images reside. GPAD automatically render images with file extension “gif”, “jpeg”, “jpg” and “png” while ignoring the rest of files in the directory/folder specified.

If a database “Image renderer” utility is open, database image can be updated directly from the directory image render (see paragraph “3.3.3 Render images”).

6 Image Cropping

GPAD provides image-cropping capability with text labels insertion in the cropped area. **Figure 62** shows image to crop window and “Crop Manager”.

6.1 Display image to crop

- To launch image cropping utility select ”Images” menu from GPAD desktop
- Select “Crop image” from “Images” menu, the “Image Process Control” window opens
- Right click in the window to display the “pop-up” menu.
- When the “pop-up“ menu appears, click on ”New Image”
- A file chooser window opens. Browse and select the image file from the file chooser window
- The new image to “crop from” is displayed and a pop-up image menu item is enabled (**Figure 62a**). With right button of mouse click on “Open Crop Manager” to display the “Crop Manager” window (**Figure 62b**)

6.2 Crop Manager

The “Crop Manager” window has three panels:

- “Image Displayed Size” panel for image size control. Click on “Normal” to display image without scaling.
- “Crop Area” panel to display crop area in pixels. Crop area width and height can be entered here
- “Image Text” panel for text label control: text field where to enter text, text font-color, text font-size, and text font-type



Figure 62: Cropping a section of an image: “Crop displaying” area (a) and “Crop manager” (b).

6.3 Setting crop area

- Click on "Apply" button to show the "crop area"
- Set the image zoom in "Zoom %"
- Drag the "crop area" to encompass the desired section of image
- With the "pop-up" menu set the X-Crop and Y-Crop dimension to adjust crop area. This can also be done from "Crop Area" panel of the "Crop Manager".

To add a label:

- Click on the "Add" button to add label
- A label with default text "Add text" is displayed in the "crop area" of the image
- Change the label text in the text field "Text"
- Set font color, size and type as necessary
- Drag label in crop area to desired location

To update labels:

- With mouse select label in "crop area"
- The "Image Text" panel is updated with the label parameters selected
- Update the label text and font parameters as necessary

7 E-mail files

Images or any other files can be e-mailed using GPAD. Today, only SMTP protocol is supported. E-mail parameters should have been stored in file "smtp.gpad" during initial GPAD deployment (see paragraph 1.1.2).

8 JPEG Explorer

JPEG Explorer utility explores JPEG image data. A window showing "JPEG Explorer" is shown in Figure 63 JPEG main image markers are listed in "Main Image" list. If the list includes JPEG marker "e1", image information is stored in the image file with "Exif" standards.

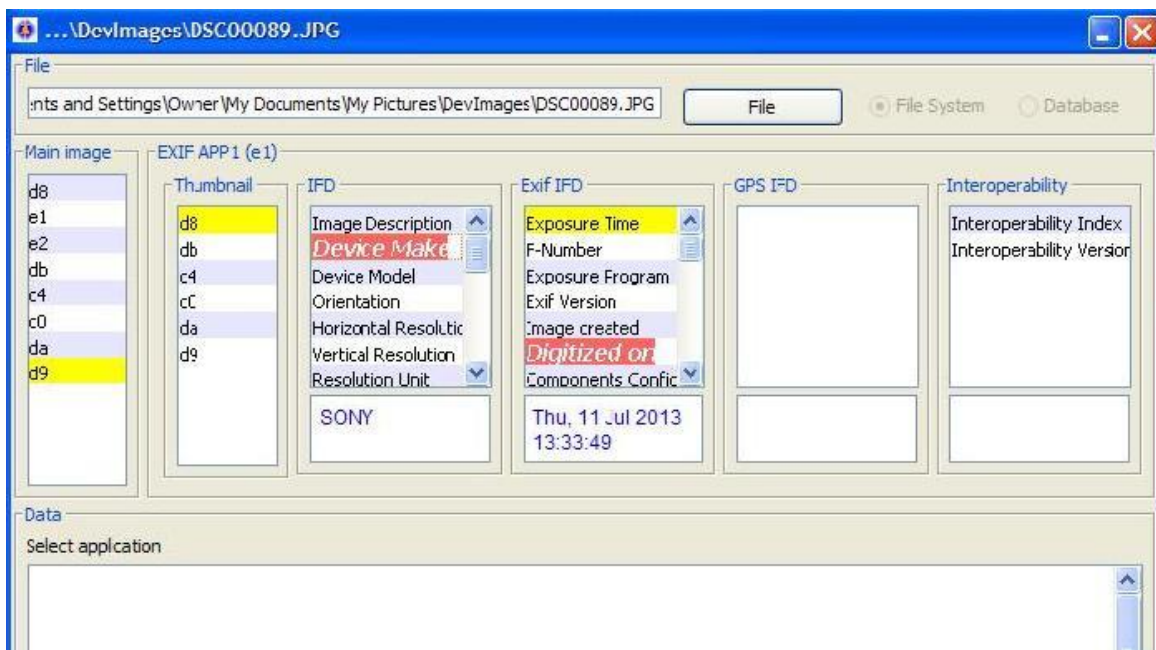


Figure 63: JPEG file explorer utility. The utility lists file markers "Main image" panel. If the list includes marker "e1" the utility displays the information in panel "EXIF APP1 (e1)".

8.1 Exif data

GPAD includes “Exif interpreter” that displays accordingly image information as shown in panel “**EXIF APP1 (e1)**” as shown in **Figure 63**. Thumbnail image and its corresponding markers are recorded in the “**Exif**” block. When “**e1**” does not exist in the main list, image “**Exif data**” is not recorded at the image making. Therefore, only JPEG support markers with corresponding data that allows decoding are recorded.

8.2 Main image

Image can be displayed by clicking on markers “**d8**” or “**d9**” from list in “**Main Image**” panel. Initial image is sized to fit in the “**JPEG Explorer**” window. **Figure 64** shows an example of the main image and corresponding menu. The image can be enlarged or reduced, in color or gray tone (black and white).

8.2.1 Enlarge

This feature enlarges the picture. Maximum size is the natural size as recorded. Image displayed can be larger than “**JPEG Explorer**” window. In this case part of the image encompassed by the window is visible. The scaling factor is 2 at each enlarge process.

8.2.2 Reduce

This feature reduces the picture. The scaling factor is 1/2 at each reduce process. Image reduction is limited to 1/8 of the original image size.

8.2.3 Displays to scale

The image will be displayed with recorded size. Image displayed can be larger than “**JPEG Explorer**” window. In this case part of the image encompassed by the window is visible.

8.2.4 Gray scale

This feature allows images to be displayed in gray scale (black and white).

8.2.5 Save current view

Image “as displayed” can be compressed with JPEG standard and saved. This feature can be used to make scaled or thumbnail copies of the image. “**Exif**” data is not recorded in the process.

8.2.6 Save primary colors

Pixels making the displayed image can be saved as raw **RGB** (Red, Green and Blue respectively) data. The bytes order recorded is R, G and B. The pixels are 8-bits (1-byte) per color component, 24-bits for all the components (pixel).

8.2.7 Close image

To go back to “**JPEG Explorer**” window click on “**Close image**”.

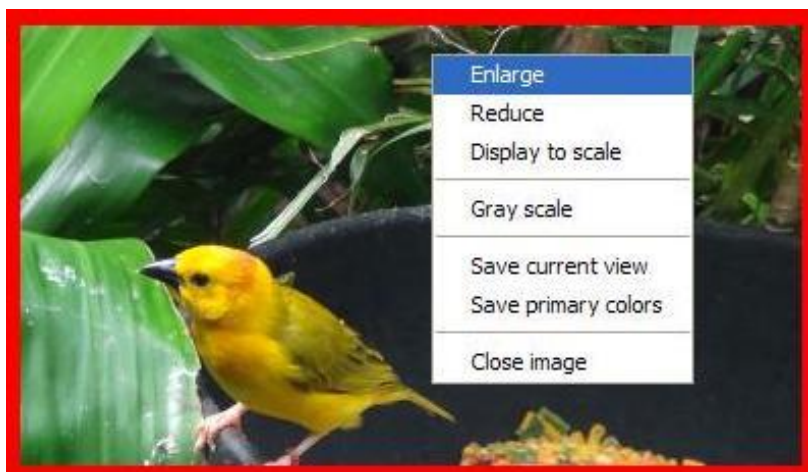


Figure 64: Main JPEG image and its corresponding menu.



Figure 65: Thumbnail image and corresponding menu.

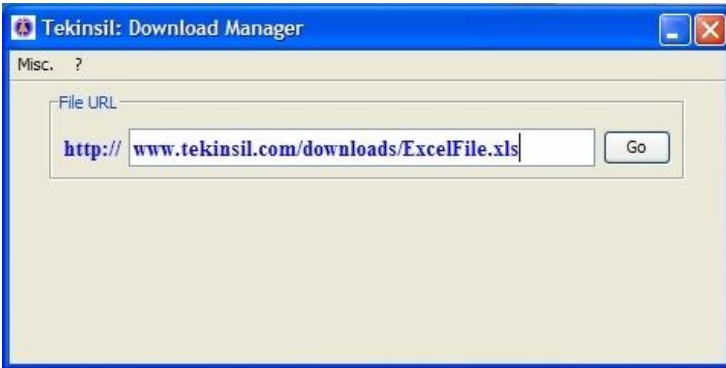


Figure 66: File Download manager window.

8.3 Thumbnail image

Figure 65 shows image thumbnail embedded in the main image file, and corresponding menu. Thumbnail image is displayed to size.

8.3.1 Save thumbnail

The feature allows Thumbnail image data to be saved in a separate image file. Occasionally, thumbnail images are not compressed. The user opts for compression or just save the data as recorded. In this process “**Exif**” data is not recorded in the image file.

8.3.2 Close thumbnail

To go back to “**JPEG Explorer**” window click on “**Close image**”.

0x0	0xf	**	**	**	**)	**	E	x	l	f	**	**	l	l	*	**
0x10	0x1f	**	**	**	**	**	**	**	**	**	**	**	**	**	**	z	**
0x20	0x2f	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
0x30	0x3f	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

a) ASCII

0x0	0xf	ffffff	ffffff0	ffffff	ffffffe1	29	ffffffe	45	78	69	65	0	0	49	49	2a	0
0x10	0x1f	8	0	0	0	9	0	f	1	2	0	6	0	0	0	7a	0
0x20	0x2f	0	0	10	1	2	0	16	0	0	0	ffffff0	0	0	0	12	1
0x30	0x3f	3	0	1	0	0	0	1	0	0	0	2a	1	5	0	1	0

b) Hexadecimal



c) Control Panel

Figure 67: ASCII-Hexadecimal file dump. Data is displayed in blocks. Blocks are displayed 16 bytes/line. Blocks are defined with an offset in file.

9 File download Manager

“Download” tab launches an application to download files from the Internet. Today only “http” protocol is supported. **Figure 66** shows download dialog window.

10 ASCII-Hexadecimal file dump

File data source can be displayed using “ASCII-Hexadecimal file dump” utility. Simple ASCII-text files or complex sources like those in images can be displayed. **Figure 67** shows a JPEG file source in ASCII format (a) and hexadecimal format (b). The control panel (c) allows navigation to any offset in file, and setting block size.

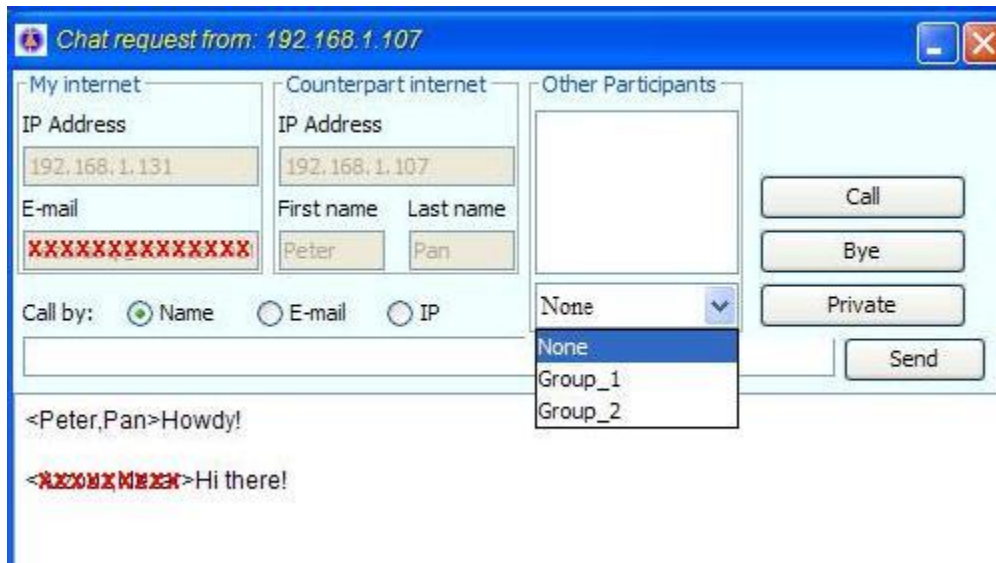


Figure 68: Chat Manager window. Chat initiator can call by “Name”, “E-mail” or “IP” address. For group chat the party that was called selects the group in “Other participants” panel. Participants call like the initiator. Names in the group must match participants name as in entered in **Figure 69b**.

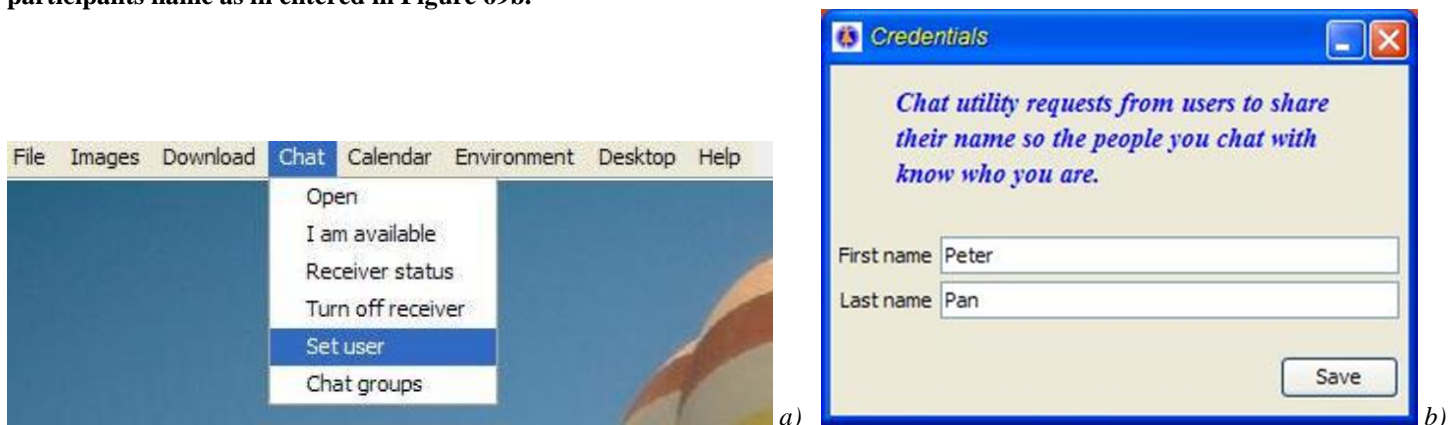


Figure 69: Setting chat credentials: invoking the dialog (a), actual dialog (b). When a user calls for a chat session his or her first and last names are communicated to the person he or she is trying to reach.

11 Secure Chat on GPAD

GPAD users can chat securely with other GPAD users over the internet (**Figure 68**). The application is based on the internet protocol **UDP (Unreliable Datagram Protocol)**. To call a counterpart for a chat, users have three options to initiate the call:

- Call by “**Name**” (first and last name): GPAD tracks and records users IP in a database. Users must set the name by opening the dialogs shown in **Figure 69**.
- Call by “**E-mail**” address: The e-mail address is stored when entering user e-mail credential (**Figure 1**).
- Call by “**IP address**”: if the “IP” is known by the caller.

An online database is used to record GPAD users. If a user's e-mail address and/or name are stored by GPAD the database is updated at GPAD application launch. The update occurs only if a user elects to have the **chat server** running.

11.1 Chat receiver

Chat receiver server listens to **port#38530**. GPAD users can elect to turn-on or off the receiver. Once turned-on, the receiver is also turned on every time GPAD desktop is launched. If a user's email is stored, GPAD updates a database with e-mail address and current user IP so other users can get in touch. The e-mail address eases GPAD users' contact, especially when the IP address is not static.

11.2 Group chat

The chat utility is designed to accommodate multiple chat participants. Participant' names are stored into groups as shown in **Figure 70**. When the chat utility is opened, it looks for these group files and makes participants available as shown in **Figure 68**. Once a "**Chat session**" is established, between two users, other participants can join the session. Once joined, the new participant receives all participants' connection credentials (IP and name), so his or her messages reach all participants in the session. The chat session can be made private at any time, excluding new comers.

11.3 Private session

To limit the session to current participants only, early users who established the session have the privilege to limit the session by clicking on the "**Private**" button.

11.4 IP Address

Users who are on different networks must set port forwarding in their "**Internet Router**" in order to be able to use the chat utility. To set the port forwarding, login to the router, then find "**Applications/Games**". **Figure 71** shows a typical port forwarding procedure in routers in the "**Application/Games**" page.

11.5 Entering message to send

Chat messages to send are entered in the text field next to "**Send**" button. When several un-interrupted messages are received from the same participant, these messages are appended to the same paragraph created for this participant. **Completed phrase** must include ".", "!", or "?" to instruct the application that any incoming messages after this completed phrase is a "**new phrase**" so the next message will be appended adequately. When a new message arrives from another participant, a new paragraph is created for this participant.

11.6 Undelivered messages

Undelivered message will not show on the chat window of the sender nor receiver. A mechanism that saves failed messages is used. Use numeric keypad "**Up/Down**" arrows or other "**Up/Down**" arrows implemented in the keyboard to view and resend undelivered messages.

11.7 Exiting a chat session

A user exits a session by clicking on "**Bye**" button. Using "**Bye**" button requires a feedback from the remote chat server to actually terminate the "**chat session**". User can choose to terminate the session by closing the chat window without waiting from remote servers. In either case the user is prompted to save the "**chat transcript**" before terminating the application.

12 Screen capture and frame images

GPAD includes features for screen capture and internal frames (windows) in GPAD. Screenshots of the computer desktop or individual frames displayed in GPAD desktop can be made. To make a screenshot of the computer desktop, click on key "**F11**". Once "**F11**" is clicked GPAD desktop is minimized so an image of the computer desktop is created. To create an image of a frame in GPAD, or GPAD desktop select the frame and press on "**F12**".

To create an image:

- Use keyboard function key F1 to create and image of GPAD
- Use F12 to create an image of GPAD internal-frames
- Use F2 to create an image of user desktop. User desktop capture includes all open-applications windows except GPAD.

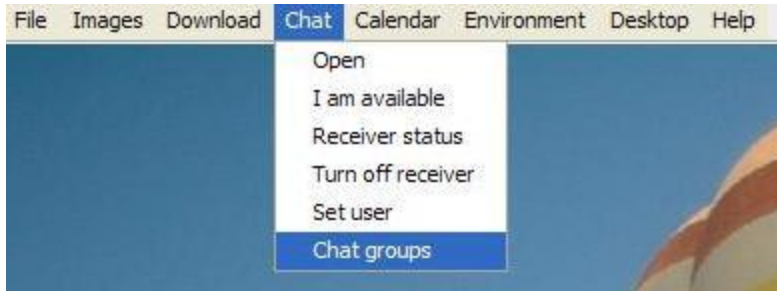


Figure 70: Chat group builder: Invoking the dialog (a), actual dialog (b).

Single Port Forwarding		External Port	Internal Port	Protocol	To IP address	Enabled
Application Name	HTTP	80	80	TCP	192 . 168 . 1 . 131	<input checked="" type="checkbox"/>
	None	---	---	---	192 . 168 . 1 . 0	<input type="checkbox"/>
	None	---	---	---	192 . 168 . 1 . 0	<input type="checkbox"/>
	None	---	---	---	192 . 168 . 1 . 0	<input type="checkbox"/>
	None	---	---	---	192 . 168 . 1 . 0	<input type="checkbox"/>
mySQL		3306	3306	Both	192 . 168 . 1 . 131	<input checked="" type="checkbox"/>
SQL		1433	1433	TCP	192 . 168 . 1 . 125	<input checked="" type="checkbox"/>
SQL_UDP		1434	1434	UDP	192 . 168 . 1 . 125	<input checked="" type="checkbox"/>
UDPReceiver ← Chat-utility		38530	38530	UDP	192 . 168 . 1 . 131	<input checked="" type="checkbox"/>
mariaDB		3306	3306	Both	192 . 168 . 1 . 103	<input checked="" type="checkbox"/>
		0	0	Both	192 . 168 . 1 . 0	<input type="checkbox"/>
		0	0	Both	192 . 168 . 1 . 0	<input type="checkbox"/>
		0	0	Both	192 . 168 . 1 . 0	<input type="checkbox"/>
		0	0	Both	192 . 168 . 1 . 0	<input type="checkbox"/>
		0	0	Both	192 . 168 . 1 . 0	<input type="checkbox"/>

Figure 71: A typical port forwarding setup in user’s router. For example in this router the chat utility is given the name “UDP Receiver” bound to port#38530. Traffic is directed to IP address “192.168.1.131”.

13 Known issues

Issues encountered during GPAD use are gathered in this section. Users are encouraged to contact GPAD team if they encounter new issues. Issues are solved as soon as they appear. Some issues, related to third parties, have temporary fixes until a permanent solution is found.

MySQL/MariaDB conflict: MariaDB driver is loaded automatically if it is available in Java library. When connecting to MySQL database with MySQL driver, connection difficulties occur. A solution would be to “unregister” MariaDB driver. Then “register” it again.

Microsoft SQL connection: Users of java virtual machine JRE1.9 and higher may experience connection issues. Open security file "java" in directory “.\jre-v.xx.yy\conf\security" and **uncomment** line "EC keySize < 224, DES40_CBC, RC4_40" in jdk.tls.disabledAlgorithms of section “Algorithm restrictions for Secure Socket Layer/Transport Layer Security (SSL/TLS/DTLS) processing”. Jre-v.xx.yy denotes version, updates, and minor update. Java home directory “. ” in Microsoft Windows is “C:\Program Files\Java”.

ACCESS database: ODBC driver “sun.jdbc.odbc.JdbcOdbcDriver” was included in releases up to JRE version 1.7. Therefore, for releases 1.8 and higher GPAD cannot access “ACCESS database”. Contact GPAD owner for more information.

Google map: Recently some older “Internet Explorer” may not get “Google maps” data. This is a Google policy. Newer “Internet Explorer” and “Chrome” browsers work fine. Also recently, Google may prompts users to reply to a “**captcha**” before sending map data to GPAD users.

GPS related address: Requesting a GPS address from Google is not free anymore. Google offers a key to purchase for this request.

Google mail (gmail): Users may have to go to <https://myaccount.google.com/lesssecureapps> and select less secure applications in order to be able to send email from GPAD using gmail service.

14 Disclaimer

- GPAD is free of charge. Use it at your own risk. No warranty is implied whatsoever.
- Some support can be provided. Use inquiry form at http://www.tekinsil.com/mailDir/php_mail_form.html
- GPAD uses port # 38629 (TCP), and 38530 (UDP) for chatting. If these ports are used by another program, GPAD will not proceed.
- Only one GPAD application is allowed to run in a computer
- Other database capabilities/functions can be added on request for a fee