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GeoDAS

GeoSIG Data Acquisition System

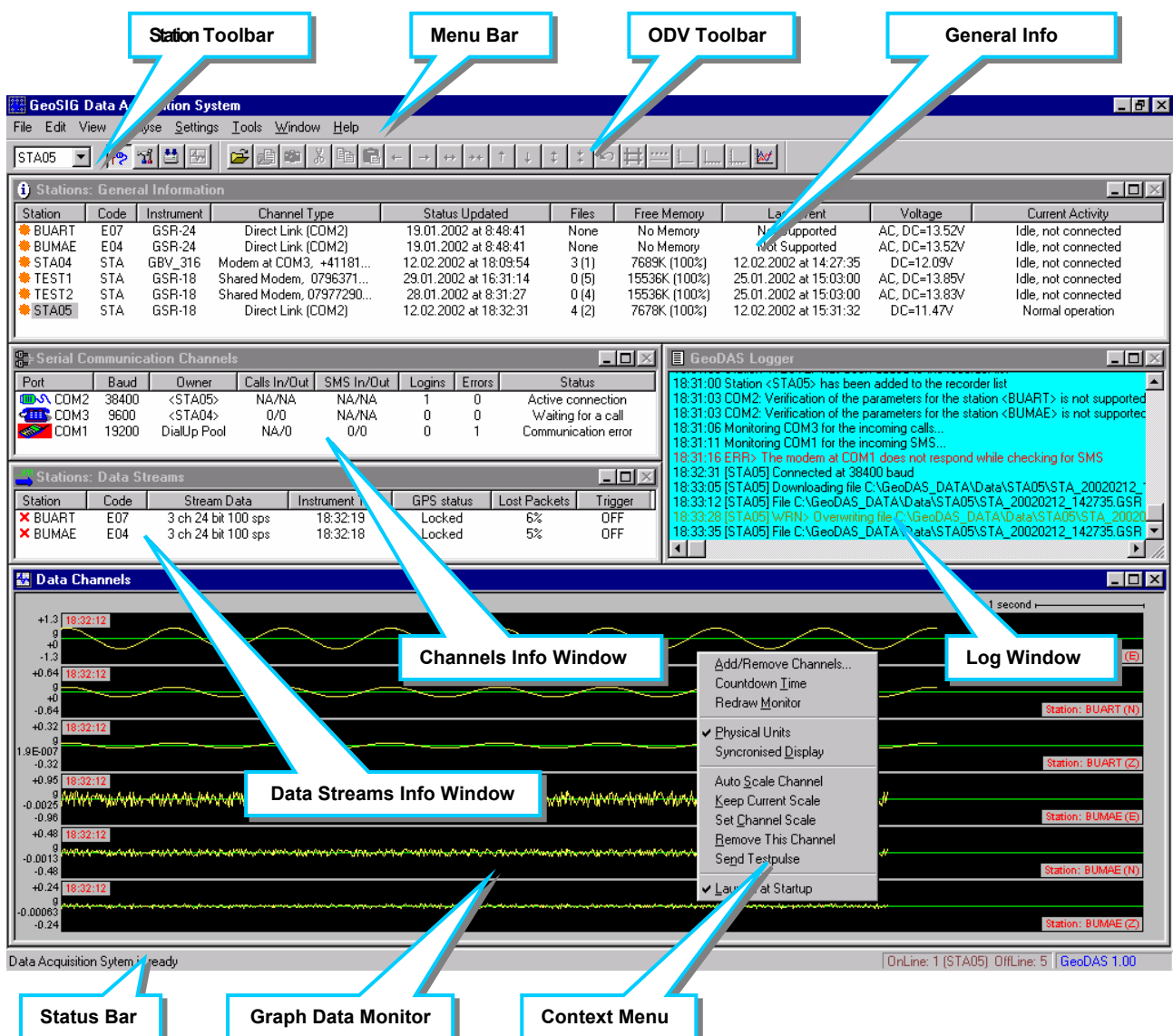
Short Description

General Notes

The GeoSIG Data Acquisition System (GeoDAS) is a graphical Microsoft Windows-based application running under Windows 98/NT4/2000/XP.

This program is used for instrument configuration and for acquisition of data provided by any standard GeoSIG instrument. Data is delivered through serial communication channels. **Two types of data delivery are supported.** The first type is event downloading. In this case the instrument is configured as a **seismic recorder**, which detects events and keeps them locally in the instrument memory. These files are transferred to the PC via telephone line or direct link to GeoDAS. The second type is a continuous telemetry link or direct connection via cable providing near real-time data from the instrument, which is configured as **digitiser** in such case. If the serial channels to an instrument are bi-directional ones, GeoDAS can perform full configuration of the remote instrument and can monitor its state of health. GeoDAS is mainly intended for serving several instruments at the same time. The instruments may have different types and parameters and they are accessed through independent serial channels.

An example of the main GeoDAS screen is shown in the figure below. The figure indicates also the basic elements of this screen: the main information windows, main menu, toolbars, context menus, etc.



General tasks of GeoDAS

- Setup of an instrument. One can change any parameters of an instrument with GeoDAS.
- State of health (SOH) monitoring. GeoDAS performs permanent or periodical monitoring of an instrument status.
- Downloading of the event files from an instrument working as a recorder
- Off-line event data view and simple data analysis
- Support for serial data streams (GSBU GeoSIG-Bergen and CWB or IASPEI formats)
- Logger features. GeoDAS keeps important messages in a log file.
- Real-time data viewer for an instrument, which provides serial data stream.

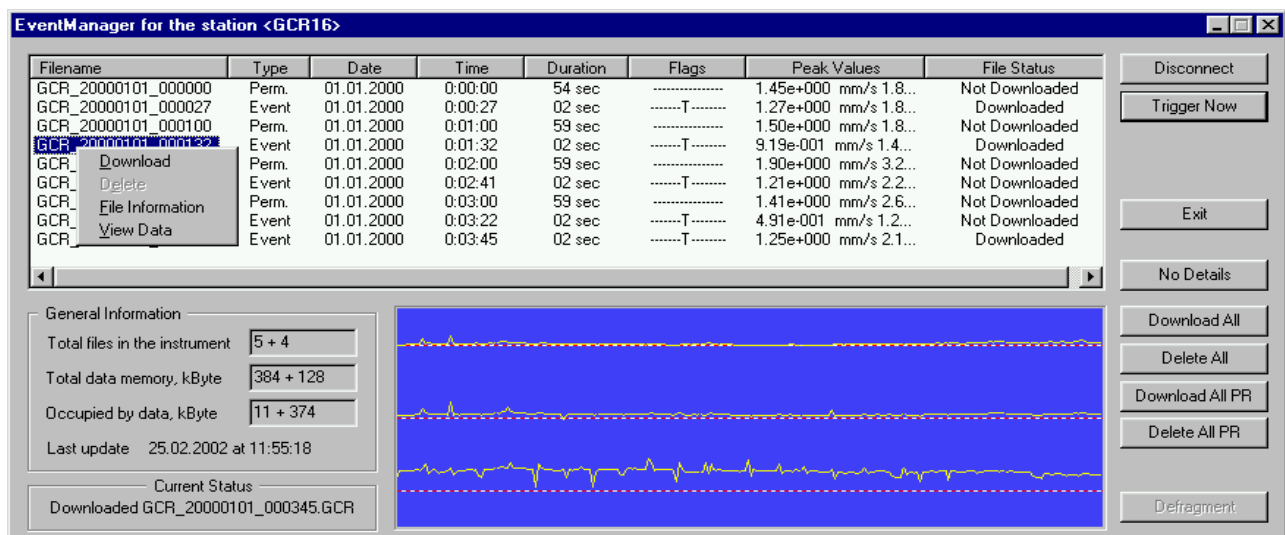
GeoDAS has been designed to meet all requirements with respect to almost every possible application. The program has an open architecture not only for multiple local recorders connected to the standard serial port, but also for networking of local recorders, supporting modem and network communications, including communication via Internet (TCP/IP protocol). These features provide flexible interfacing between GeoSIG recorders and users irrespective of how far they are located from each other.

Additionally to the features above, GeoDAS allows all the Windows standard functionality to be used in an easy and intuitive way. The Program provides a perfect software interface between users (operators) and hardware based on GeoSIG recorders of GSR/GCR/GBV product lines. Besides that, GeoDAS provides data analysis, which has been developed mainly for civil engineering purposes and preliminary seismic analysis of recorded data. With GeoDAS one can set any configuration of GeoSIG recorders, which is supported by current versions of hardware. Furthermore, the program keeps compatibility with the previous versions of GeoSys recorders based on GSR-12/16. GeoDAS supports data exchange between the recorders and the PC both in interactive and automatic modes of operation.

Recording the Events

The most typical operation mode of GeoSIG instruments is the standalone recorder. After the installation of such an instrument, one has to set its parameters in a way that the instrument will be capable of recording the events. The event files containing data records are kept in the recorder memory, which is usually an ATA flash memory card or on-board SRAM. As soon as new event files are saved to the recorder memory, one can login to this recorder with GeoDAS and can download these files to the computer. Further the event files can be viewed, processed and analysed with the Off-Line Data Viewer.

In general there are two possibilities: either data files are downloaded by GeoDAS automatically or the user can do so at any time in the manual mode with the Event File Manager, which is shown in the figure below.

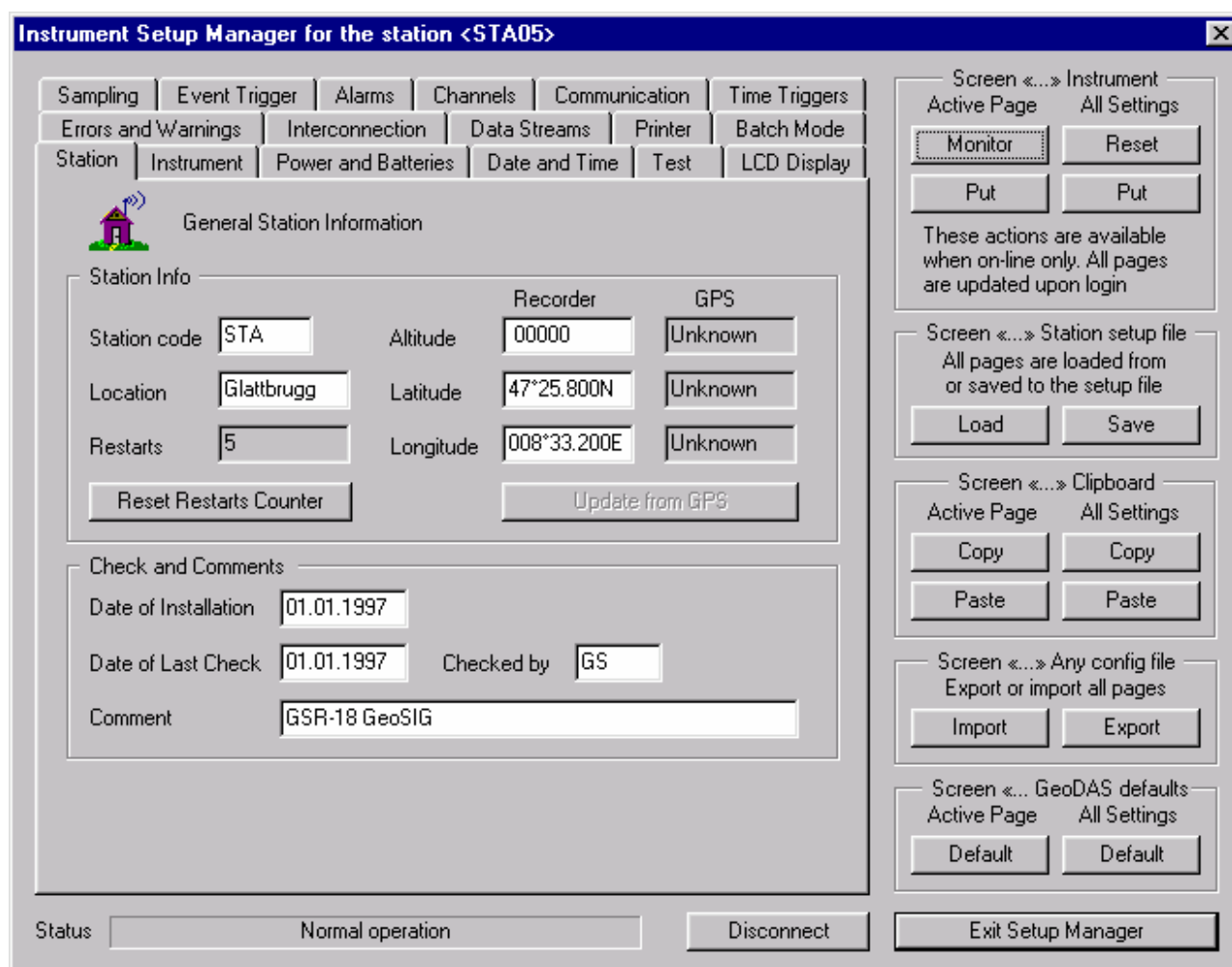


Filename	Type	Date	Time	Duration	Flags	Peak Values	File Status
GCR_20000101_000000	Perm.	01.01.2000	0:00:00	54 sec	-----	1.45e+000 mm/s 1.8...	Not Downloaded
GCR_20000101_000027	Event	01.01.2000	0:00:27	02 sec	-----T-----	1.27e+000 mm/s 1.8...	Downloaded
GCR_20000101_000100	Perm.	01.01.2000	0:01:00	59 sec	-----	1.50e+000 mm/s 1.8...	Not Downloaded
GCR_20000101_000132	Event	01.01.2000	0:01:32	02 sec	-----T-----	9.19e-001 mm/s 1.4...	Downloaded
GCR_20000101_000200	Perm.	01.01.2000	0:02:00	59 sec	-----	1.90e+000 mm/s 3.2...	Not Downloaded
GCR_20000101_000241	Event	01.01.2000	0:02:41	02 sec	-----T-----	1.21e+000 mm/s 2.2...	Not Downloaded
GCR_20000101_000300	Perm.	01.01.2000	0:03:00	59 sec	-----	1.41e+000 mm/s 2.6...	Not Downloaded
GCR_20000101_000322	Event	01.01.2000	0:03:22	02 sec	-----T-----	4.91e-001 mm/s 1.2...	Not Downloaded
GCR_20000101_000345	Event	01.01.2000	0:03:45	02 sec	-----T-----	1.25e+000 mm/s 2.1...	Downloaded

Setup of an Instrument

Any parameter of any GeoSIG standard recorder can be set with GeoDAS. The instrument will work according to these settings, even without being connected to the computer, since they are saved in the instrument memory. The user interface for setting parameters is shown in the figure below.

The dialog called Instrument Setup Manager consists of several pages or tabs. They are filled up with the detailed information stored in the instrument. The following pages are available: **Station, Instrument, Sampling, Channels, Date and Time, Data Streams, Communication, Interconnection, Event Trigger, Time Triggers, Error and Warnings, Test, Power and Batteries, Alarms, Printer, Batch Mode, LCD Display.**



Instrument Setup Manager for the station <STA05>

Sampling | Event Trigger | Alarms | Channels | Communication | Time Triggers
 Errors and Warnings | Interconnection | Data Streams | Printer | Batch Mode
 Station | Instrument | Power and Batteries | Date and Time | Test | LCD Display

General Station Information

Station Info

	Recorder	GPS
Station code: STA	Altitude: 00000	Unknown
Location: Glattbrugg	Latitude: 47°25.800N	Unknown
Restarts: 5	Longitude: 008°33.200E	Unknown

Reset Restarts Counter | Update from GPS

Check and Comments

Date of Installation: 01.01.1997
 Date of Last Check: 01.01.1997 | Checked by: GS
 Comment: GSR-18 GeoSIG

Status: Normal operation | Disconnect | Exit Setup Manager

Screen «...» Instrument
 Active Page | All Settings
 Monitor | Reset
 Put | Put
 These actions are available when on-line only. All pages are updated upon login

Screen «...» Station setup file
 All pages are loaded from or saved to the setup file
 Load | Save

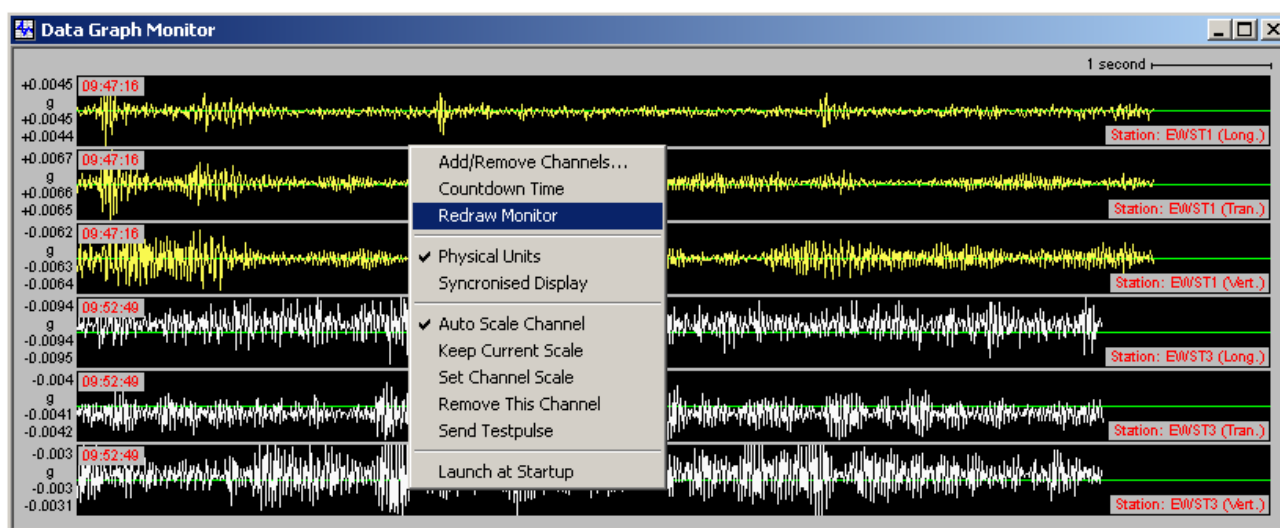
Screen «...» Clipboard
 Active Page | All Settings
 Copy | Copy
 Paste | Paste

Screen «...» Any config file
 Export or import all pages
 Import | Export

Screen «...» GeoDAS defaults
 Active Page | All Settings
 Default | Default

Working with Data Streams

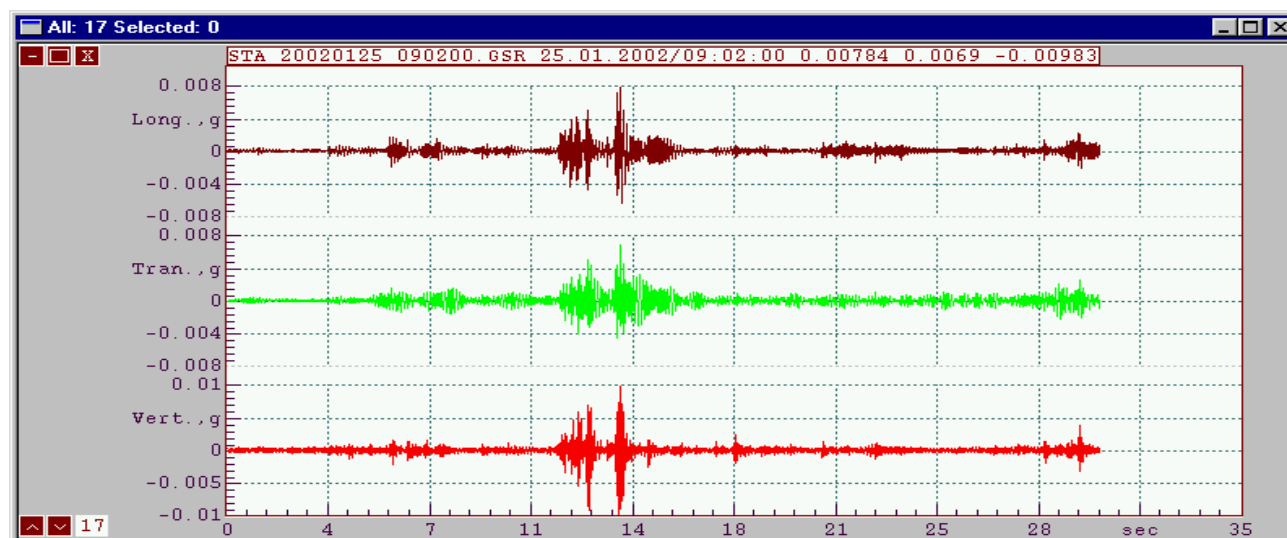
Several types of GeoSIG instruments, such as GBV and GSR-18/24, can provide the streams of data through the serial communication channel. Data streams carry either data samples, which are sent in the binary format as soon as they are gathered from the A/D converters, or data packets of samples collected within a time frame of maximum one-second interval. In general the instruments are capable of recording files and sending data streams at the same time. But very often it is not required, so the instruments may have no event memory. They work as digitizers only providing data streams. The data delivered by a stream can be saved to files, analysed, used for issuing a seismic network trigger and forwarded to other data processing applications, for instance, to the **USGS Earthworm software package**. The Data Graph Monitor is a graphical representation of the active data streams. The data signals arriving from the instrument are displayed as waveforms:



Off-line Data Viewer of GeoDAS

The Off-Line Data Viewer (ODV) is intended for reviewing and interactive analysis of the digital signals off-line. Original waveforms are taken from a file, which can have one of the standard formats created or supported by other GeoSIG software and by the data recorders.

The ODV supports various numbers of data channels in such way that operators could display on the screen and plot any set of them in any combination, make scaling, zooming, axis style changing, export to and import from various data formats, etc. in intuitive manner. Mathematical analysis will include such operations like digital filtering, response spectra calculation, integration and differentiation of signals, CAV calculation and others.



Other Capabilities of GeoDAS

The general functionality of GeoDAS briefly described above is used in most applications based on GeoSIG equipment. But GeoDAS offers also the special functionality, which is required for particular applications or it can be activated in some special cases only:

- **Strong Motion Data Processing**

The GeoSIG GSR-18 instruments can provide parametric information containing the peak values and spectral characteristics of the shaking parameters. This information can be used to estimate the intensity of the shake in those points where instruments are located and to create a distribution of these parameters throughout the area monitored by many instruments.

- **Messenger of GeoDAS**

This is a tool, which is used to deliver different types of information from GeoDAS to the subscribers via email and/or SMS (short message service).

- **Network Links of GeoDAS**

GeoDAS can communicate to other instances of itself as well as to other applications developed by GeoSIG through Windows sockets.

- **Monitor Mode of Operation**

The monitor mode is used in multi-computer configurations only. A GeoDAS application installed as monitor can control other GeoSIG applications and can provide general information about them to the subscribers by email an/or by SMS messages.

- **Data Analysis (OPTIONAL)**

The Data Analysis part of GeoDAS has been developed by GeoSIG especially for the strong motion, earthquake engineering and civil engineering data analysis. The following math operations are performed:

- Average values
- Frequency domain filtering
- Lowpass filtering
- Highpass filtering
- Baseline correction
- Integration of the signal to get the velocity and displacement
- Vector Sum
- Cumulative Absolute Velocity (CAV)
- Time domain filtering (Parzen, Hanning, Welch, Hamming)
- Effective Value (DIN 45 669)
- Damping and Eigenfrequency
- Power Spectrum calculation
- Fast Fourier Transformation (FFT)
- Terzband Spectrum calculation
- Response Spectrum for any damping in acceleration, velocity and displacement
- A sequence of operations

All the operations listed above are performed with the Off-line Data Viewer in a way that a user can see the result of every operation in the graphical format

Specifications subject to change