System architecture of «UNIVERS» software

Version 1.4

1.UNIVERS software contents

UNIVERS software includes next packages:

- UNIVERS Base Processing – main VSP data processing package implemented for OS Linux (i386 and AMD64 architectures) and Solaris (SPARC architecture). Data are stored in own file-based database management system LDB (Local Database).
- UNIVERS Hardcopy – package targeted to preparation of high quality report pictures. It is implemented for OS MS Windows XP (i386 architecture). It works with data stored in LDB.
- UNIVERS Field Processing – package for in field VSP data fast quality control and processing. It is implemented for OS MS Windows XP (i386 architecture). It works with data stored in MS Access database management system.

2.Database technology

- LDB (Local Database) is database management system used in packages UNIVERS Base Processing and UNIVERS Hardcopy. It has next features:
  - ✔ multi-file-server architecture
  - ✔ support both local and network access (via NFS and SMB)
  - ✔ safe simultaneous operations in multi-user multi-process network environment
  - ✔ efficient and compatible storage for all workstations (Linux, Solaris, Windows)
  - ✔ support for large storage objects (>2Gb)
- MS Access is a standard RDBMS which is used in UNIVERS Field Processing for data storage. It does not support for network and multi-user simultaneous access. It's used for storage both table and seismic data. Some import/export operations to LDB and universal data format are supported by UNIVERS Field Processing package.

3.Hardcopy technology

3.1.UNIVERS Base Processing package specifics

The package does not have own printing subsystem and standard UNIX printing subsystem is not used too. In most programs of UNIVERS Base Processing menu item **File|Print** or **File|Save image** means saving picture of work area into raster image file. These capabilities are enough to include picture to a text of processing report when no precise scaling is needed.

Some programs allows to store picture in file of PostScript format. Such file can be drawn on printer or plotter with exact scale and with high quality or imported into graphics editor (CorelDRAW, for example) for further decoration.

3.2.UNIVERS Hardcopy package specifics

The package is targeted to preparation of report graphics in EMF vector format and BMP raster format. A picture in EMF is prepared using custom scale and size for horizontal and vertical axis. Final picture is supposed to be preapred in universal graphics editor (such as CorelDRAW) by including prepared EMF and BMP files and composing all needed decorations (frames, legend, label etc).

In general, MS Windows printing subsystem is used.

3.3.UNIVERS Field Processing package specifics

The package uses MS Windows printing subsystem.

4.Software license protection

4.1.General information

UNIVERS software is protected from usage against license conditions agreement. The check of the license is performed always locally on the computer where UNIVERS programs are executed.

The computer confirmed to run UNIVERS (licensed computer) is determined by a hardware dongle plugged in LPT or USB port or by hostid (in case of Solaris for SPARC). The first case allows to change licensed computer simply to another one. In the second case it's possible to change licensed computer only by changing license conditions.

License conditions are encoded in the license number written in text format in special file (license.num). To change license conditions one need to replace one license number by another one, which can be delivered on digital storage media, by email, by fax or even written by listening number by telephone. Re-programming a dongle is not needed to change license conditions.

4.2.License conditions

a) Number of simultaneous working users on licensed computer. It limits number of sessions which run UNIVERS Base Processing at the same time. On MS Windows it's supposed the only session runs so this parameter is not applicable.

b) Validity time range: begin and end data. Eternal licensing is provided by prolongation of the license and/or by extremely long validity range.

c) Identification number of dongle or CPU numbers (hostid, up to 4 in one license number) to which a license is tied.

d) Licensed software packages (several different packages can be licensed simultaneously).

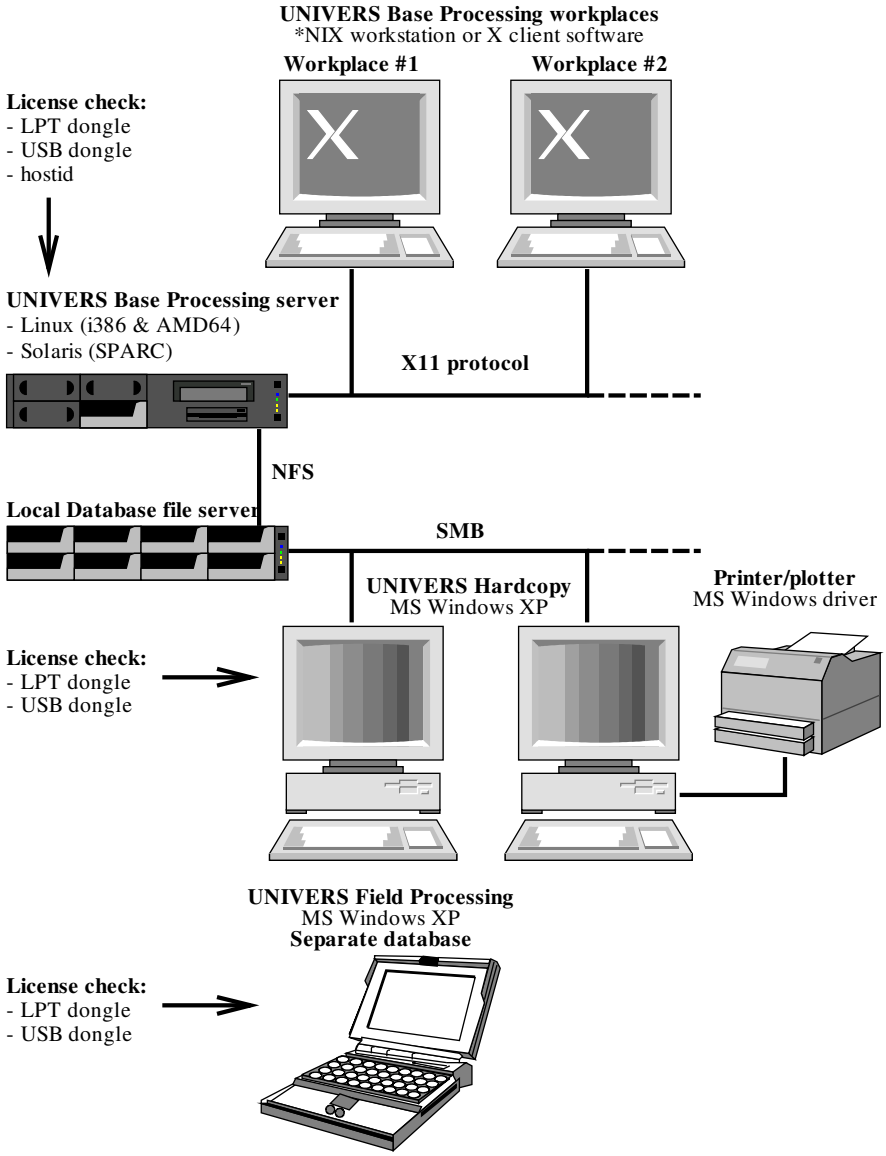
Above that conditions an addition check for illegal UNIVERS software update is implemented even if the license is still valid.

Number of CPU/cores, RAM volume, types and parameters of HDD and network cards as well other hardware and system software characteristics are not used in UNIVERS software license protection.

5.Typical configurations

The most general scheme of UNIVERS software configuration on hardware facilities is represented on Picture 1.

Since UNIVERS Field Processing package is designed for stand-alone usage and it's not linked with UNIVERS Base Processing and UNIVERS Hardcopy by common database, so it can be installed on any computer with MS Windows XP, for example on notebook.



Picture 1: Generalized system architecture of UNIVERS software

5.1.Workstation “all-in-one”.

Use case: Mobile work place for small amount of VSP data processing.

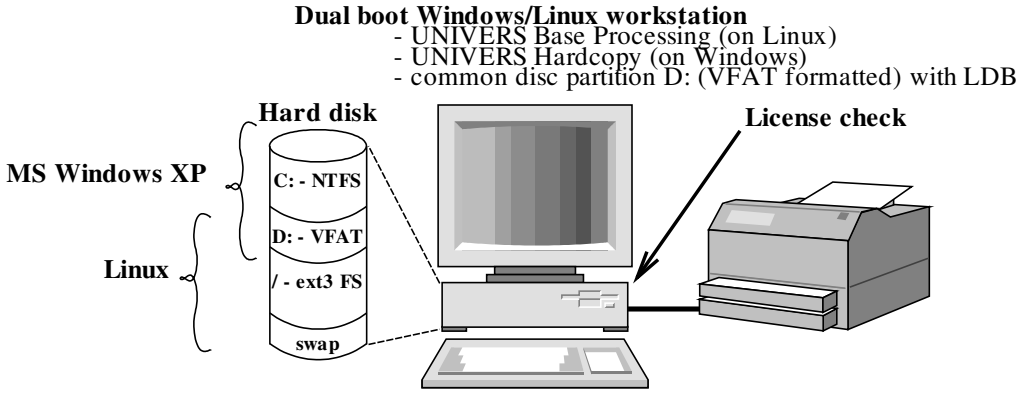
Description: Two operating systems are installed on the same computer: Linux variant and MS Windows XP. Bootloader is installed to select exact OS to boot. One hardware dongle is enough to provide UNIVERS software license support. LDB files are stored on local disc formatted as VFAT (limited size of volume is 32Gb), NTFS or Ext2/Ext3. This disc has to be mounted both by MS Windows XP and by Linux. Next drivers are freely available to implement this requirement:

- Mounting VFAT under Linux is provided by built-in kernel driver.
- Mounting Ext2/Ext3 under Windows: Ext2 Installable File System For Windows (http://www.fs-driver.org)
- Mounting NTFS under Linux: NTFS-3G Stable Read/Write Driver (http://www.ntfs-3g.org)

In all cases the disc has to be mounted on OS startup and it should be permitted for user to read and write this disc. Usually this leads to that the only non-system user in OS may access the disc. See work place configuration on picture 2.

Advantages: mobility; compactness; cheap; simple to use.

Disadvantages: limited performance; impossibility to process data and to prepare report; limited size and reliability of VFAT(in case of it's usage).



Picture 2: Configuration on the only computer.

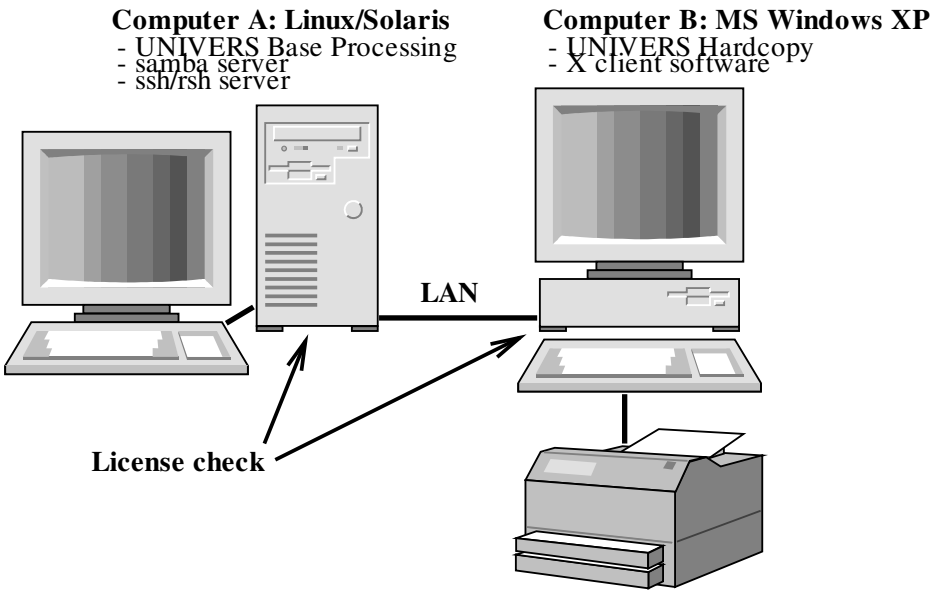
5.2.Configuration “two workplaces”.

Use case: Workplace to process small amount of VSP data with capability for simultaneous processing and report preparation. If needed it's possible to use Windows computer as second workplace for UNIVERS Base Processing.

Description: Two computers in LAN connection are used as two UNIVERS workplaces. One of the is Linux or Solaris computer used to store processing data (computer A). Another computer runs MS Windows XP (computer B). Computer A is used as LDB server and as UNIVERS Base Processing workplace. Computer B is used as UNIVERS Hardcopy workplace. Licenses (and hardware dongles) are plugged to both computers. See picture 3.

Advantages: cheap; simple to use; capability to have two UNIVERS Base Processing workplaces using computing power of one computer A.

Disadvantages: limited scalability.



Picture 3: Two computers configuration.

5.3.Configuration “data processing server”.

Description: UNIVERS Base Processing package is installed on powerful server (computer A) with several CPUs/cores, large RAM and disc array. Multiuser license is installed on the server (and hardware dongle in case of Linux). Remote computers B are used as UNIVERS Base Processing workplaces. Remote comput-

ers C with MS Windows XP and UNIVERS Hardcopy have own hardware dongles and licenses. Computers from B and C subsets may be the same.

Use case: Several workplaces for large department and VSP, 2D/3D+VSP, 2D/3D VSP data processing. Simultaneous processing and report preparation is possible. Workplaces for UNIVERS Base Processing are not fixed – any computer may be used for this purpose.

Advantages: simplicity for system administration and license management; large seismic data are not transmitted across LAN (critical for 2D/3D+VSP and 2D/3D VSP).

Disadvantages: relatively expensive server; performance of processing is directly depends on server's computation power and it's I/O capabilities, so in case of 2D/3D processing number of efficient workplaces is significantly limited.

5.4. Configuration "maximum of workplaces".

Use case: large amount of VSP processing.

Description: UNIVERS Base Processing package is installed on every workstation with separate licenses (computers A). Data are stored on special file-server (computer B) with large disc array. In fact UNIVERS Base Processing itself may reside on file-server too and can be shared via NFS among computers A together with licenses for all hardware dongles (gathered in one file license.num). UNIVERS Hardcopy package is installed with license on computers C. Computers A and C may be the same if two OS, Linux and MS Windows XP are installed on them.

Advantages: maximum total performance and workplaces configuration flexibility.

Disadvantages: performance is limited by LAN bandwide and I/O capability of file server; it's not recommended to use for 2D/3D data processing; relatively complex system administration.

5.5. Other configurations

Described configurations are "typical" meaning that each one implements some approach in pure form. Hybrid variants may be realized as well. For example, if large VSP processing including 2D/3D takes place it's reasonable to mix "data processing server" and "maximum workplaces" configurations. Data processing server and database server may be the same or different computers.