WOW Software 5000.0.1.11

Release Notes and Administration Manual

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Third Party Applications

Halliburton uses various third-party applications in the development of its software.

Halliburton acknowledges that certain third party code has been bundled with, or embedded in, its software. The licensors of this third party code, and the terms and conditions of their respective licenses, may be found at the following locations:

`$OWHOME/docs/third_party.pdf`

`$OWHOME/WebApps/tcltk/license.terms`

WOW is part of Halliburton's WebApps technology framework. WebApps is the shared architecture and directory name for the following products: WOW, Corporate Data Archiver (CDA), and Project Administrator (PA).

The following table lists the third party applications in WebApps 5000.0.

Product	Version	Company
Tcl/Tk	List of Tcl modules: • Tcl 8.4.14 • Tk 8.4.14 • Tbcload 1.6.1 • Oratcl 4.5 • TkTable 2.9 • TclXML 2.6 • Cgi.tcl 1.10 • BWidget 1.8 • Tcllib 1.9 • Tklib 0.4.1	Open Source (Code from SourceForge)
mod_auth_pam.so	1.1.1	Open Source
shapelib	1.2.10	Open Source (MapTools.org)
DGNLib	1.5	Open Source (MapTools.org)
Centera® SDK	3.1	EMC®
SDI cgm2png	1.0	System Development, Inc
EarthVision® EVGridIO api	1.2	Dynamic Graphics®

WebApps uses software developed by the Apache Software Foundation (http://www.apache.org). Apache is not distributed with WOW; the product uses the version of Apache 2.x delivered with the operating system.

Dynamic Graphics and EarthVision are registered trademarks of Dynamic Graphics, Inc. in the United States and other countries.

EMC is a registered trademark of EMC Corporation. Centera is a trademark of EMC Corporation.

Freeware source code INPOLY.C: Copyright (c) 1995-1996 Galacticomm, Inc.

International Trade Compliance

This application is manufactured or designed using U.S. origin technology and is therefore subject to the export control laws of the United States. Any use or further disposition of such items is subject to U.S. law. Exports from the United States and any re-export thereafter may require a formal export license authorization from the government. If there are doubts about the requirements of the applicable law, it is recommended that the buyer obtain qualified legal advice. These items cannot be used in the design, production, use, or storage of chemical, biological, or nuclear weapons, or missiles of any kind.

The ECCN's provided in Release Notes represent Halliburton's opinion of the correct classification for the product today (based on the original software and/or original hardware). Classifications are subject to change. If you have any questions or need assistance please contact us at: FHOUEXP@halliburton.com

Under the U.S. Export Administration Regulations (EAR), the U.S. Government assigns your organization or client, as exporter/importer of record, responsibility for determining the correct authorization for the item at the time of export/import. Restrictions may apply to shipments based on the products, the customer, or the country of destination, and an export license may be required by the Department of Commerce prior to shipment. The U.S. Bureau of Industry and Security provides a website to assist you with determining the need for a license and with information regarding where to obtain help. The URL is: http://www.bis.doc.gov

Definitions

CCATS (Commodity Classification Automated Tracking System) - the tracking number assigned by the U.S. Bureau of Industry and Security (BIS) to products formally reviewed and classified by the government. The CCATS provides information concerning export/re-export authorizations, available exceptions, and conditions.

ECCN (Export Control Classification Number) -The ECCN is an alpha-numeric code, e.g. 3A001, which describes a particular item or type of item, and shows the controls placed on that item. The CCL (Commerce Control List) is divided into ten broad categories, and each category is further subdivided into five product groups. The CCL is available on the EAR Website (http://www.access.gpo.gov/bis/ear/ear_data.html#ccl).

The WebApps Software, including WOW, Corporate Data Archiver (CDA) and Project Administrator (PA) are classified as follows: **ECCN number: 5D002**, **License type: ENC, CCATS number: G055789**. This information was last updated on 2/11/2008.

Introduction

WOW provides dynamic access to E&P data over the company intranet. The product addresses one of the biggest challenges facing the E&P business: making information available to business users in time to facilitate decisions. Because subsurface professionals spend too much time on non-productive data management tasks, WOW allows users to quickly find, document, manage and QC vital project data:

- **Find data fast:** rapid web-based browsing of projects – great for familiarizing users with a new project area.
- **Find data easily:** a simple, uniform interface means users don't need to know all the underlying applications, databases and systems.
- **Capture knowledge:** allow users to document projects, providing context to enhance the content.
- **Cleanup project data:** a number of functions for managing the underlying data.

WOW is a 'thin client' application, which means that the majority of content is generated dynamically on the Web server by reading the underlying databases, formatting and then sending results to the Web browser. This means also that there are no client-side dependencies, i.e. plug-ins to be downloaded or installed, considerably simplifying maintenance.

WOW coverage is considerable and is constantly expanding in both depth and breadth: see Appendix 6 for a functionality checklist.

- OpenWorks
- SeisWorks
- Z-MAP Plus
- GeoProbe
- VIP
- ProMAX
- AssetJournal
- SEG-Y, LAS and CGM files
- ESRI shapefiles and DBF files
- Archives (from Corporate Data Archiver - licensed separately)
- Project data analysis (from Project Administrator - licensed separately)

Enhancements and Fixes

Version 5000.0.1.11

Important note: WOW 5000.0.1.11 is an update, which does ***not*** require re-installation of the WebApps software tree. See Patching the Installation for patch location and installation instructions. WebApps 5000.0.1.11 is compatible with **OpenWorks 5000.8.3.01** and above.

1. OpenWorks/SeisWorks: change default project listing to display project hierarchy rather than just PDBs by default. For SeisWorks-mode projects change default grouping to be per project. These defaults can be set using environmental variables `WOW_OW_LISTING`, `WOW_SW_LISTING` and `WOW_SW_GROUPING`. Also add SeisWorks-mode project links to the OpenWorks project summary (defect 932012).
2. OpenWorks: rename 'Data Map' to 'District View' and add option to display 3D surveys across all districts/projects (defect 932012).
3. OpenWorks: various improvements to the Survey summary page: separate out a corner coordinate table, replace fault segments with planes, and display external files referenced in OpenWorks (defect 932012).
4. OpenWorks: add a multi-survey side-by-side horizon view with options to display navigation basemap and 2D horizon panes (defect 930062).
5. OpenWorks: add 3D survey legend/colors to navigation map (defect 930062).
6. OpenWorks: explain curve units displayed on RTM page (defect 921500).
7. OpenWorks: add option to display IP AOI in X/Y or Lat/Lon (defect 907346).
8. OpenWorks: correct IP CRS name in IP selection criteria (defect 929974).
9. OpenWorks: fix remark entry for interpretation projects (defect 929974).
10. OpenWorks: add view unassigned segments link on faults page (defect 929974).
11. OpenWorks: merge VC/R list viewing on project summary page (defect 929974).
12. OpenWorks: add link to browse all external data directories (defect 929974).
13. OpenWorks: trap issue with WGS84 shapefiles on newly-created projects (defect 929868).
14. Info/Errors: fix OpenWorks version determination (defect 933725).
15. Subscriptions: add option to filter by data source (defect 923013).
16. Z-MAP Plus / Other Data: add link to configure directories (defect 929974).
17. `TvdConvert` GUI: fix error when there is only one numeric column in the input file (defect 930846).
18. SeisWorks/`SeisLT0`: change live trace outline ZGF picture names to use seismic data set name/version rather than seismic file name (defect 910040).

Version 5000.0.1.10

WOW 5000.0.1.10 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.3.01 and above.

1. Shapefiles: also copy .prj file if it exists when creating shapefiles from ZGF files in OpenWorks project directories (defect 919765).
2. `SeisLTO3D`: add seismic line/trace to ASCII output option (defect 912486).
3. `PickReport`: fixed error running on projects with over 15 characters in their name (defect 920331).
4. General: fixed issue overwriting during patch of existing `project_keyfacts.dat` or `survey_keyfacts.dat` files (defect 917776).
5. Apache: include instructions and media for performing NIS authentication using `mod_auth_external.so` and `pwauth` (see `WebApps/dso/external.README`).

Version 5000.0.1.9

WOW 5000.0.1.9 is an update, which does *not* require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.3.01 and above.

1. General: port to OpenWorks 5000.8.3.01 (version 9.1) libraries.
2. OpenWorks: changed well list 'Save to ASCII file' and picks 'Download in Petrel format' to use plain text rather than Excel mime type.
3. Shapefiles: create and allow download of a zip file containing shape file contents for all browser-based shapefile generators (defect 908626).
4. Shapefiles: also copy .prj file if it exists when creating shapefiles from dts and zcm files in OpenWorks project directories (defect 912706).
5. OpenWorks: fixed 3D survey list handling when generating WGS84 or projected shapefiles (defects 912955 and 912956).
6. OpenWorks: do not check 2D line list type when generating shapefiles, allow both 'SL' and '2D' (defect 912081).
7. OpenWorks: fixed error displaying velocity model I3DV header / contents (907813).
8. `PickReport`: fixed error running on interpretation projects (defect 908039).
9. Subscriptions: fixed issue processing subscriptions with multiple districts (911720).
10. SeisWorks: change live trace outline png images to display seismic data set name rather than file name (defect 910040).
11. SeisWorks: fixed issue with inverted dts fault polygon images (defect 912700).
12. `HrzImage`: fixed issue with 2D horizon image generation (defect 912208).
13. Z-MAP Plus: fixed error creating world file for ZGF picture GIS images (911633).
14. Z-MAP Plus: provide command-line `zgfImage` utility to generate GIS images for one or all pictures in a ZGF (defect 911551).
15. General: fixed documentation error on changing between dark/light color schemes (defect 914425).

Version 5000.0.1.8

WOW 5000.0.1.8 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. General: new dark color scheme used by default, original light scheme still available.
2. OpenWorks: added new cross-district OpenWorks project data map to display data counts, remarks, CRS, measurement system and other information for all projects in the WOW instance.
3. OpenWorks: allow addition/modification/deletion of a multi-part 'key facts' record per project.
4. OpenWorks: allow addition/modification/deletion of multiple typed remarks per project.
5. OpenWorks: allow editing of the single main project remark.
6. OpenWorks: provide option to convert XY and Lat/Lon coordinates on the Well Header Table display for IPs with a different CRS to the parent PDB.
7. Comparison: display and color-code differences on the well header comparison (defect 899834).
8. QC/QA: new queries for detecting 2D/3D horizon data duplicates, horizon headers without data, and empty horizon data (defect 903476).
9. QC/QA: updated queries for orphaned grid and vector data to reference GRID_HDR_ALL rather than GRID_HDR (defect 901708).
10. Directory browsing: support drill-down for `.dts` (mapping) and `.zcm` (zone control) files (defect 906357).
11. SeisWorks: for 3D projects display horizon data rather than header table; for individual horizons display the full path to the external file and its owner (defect 890578).
12. SeisWorks: provide a link at top of page to view thumbnails if generated; change logic to use thumbs generated for either the IP or the parent PDB (defect 907311).
13. `SeisLT03D`: added fields Attribute, Version, File and RecordDate to shapefile dbf output (defect 904045/6). Note that this change requires preexisting shapefiles to be recreated.
14. SEG-Y Viewer: fix to correctly handle 8-bit integer files (defect 901722).
15. General: improve handling of single-district instances.
16. General: refresh top bar every 10 minutes to pick up district changes.
17. General: standardize all Save to Excel links to specify .xls content with a default file name (defect 885201).

Version 5000.0.1.7

WOW 5000.0.1.7 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. QC/QA: provide option to save results for all projects to a single table when running in cross-project mode (defect 900846).
2. Shapefiles: allow user to specify top or bottom hole location for OpenWorks well shapefiles (defect 899015).
3. Shapefiles: copy project-specific .prj file (if present) when creating polygon shapefiles (defect 898889).
4. Shapefiles: replace file stem spaces with underscores on OpenWorks and ZGF shapefile creation.
5. Shapefile viewer: fixed issue with stringing polygons together incorrectly.
6. OpenWorks: fixed issue with reversed grid color legend (defect 899898).
7. OpenWorks: allow deletion of KRS documents by any member of the `WOW_ADMIN_GROUP` (defect 901114).
8. `SeisLTO`: when run in exact mode was not creating .asc files correctly.
9. All GUI utilities: prevent popup dialogs from being covered by the main window.

Version 5000.0.1.6

WOW 5000.0.1.6 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. Utilities: added a command-line and GUI `TvdConvert` utility for converting between MD and TVD depths in formatted ASCII files (defect 886392).
2. Utilities: added a command-line and GUI `SeisPoly` utility to spatially clip a 3D seismic volume to specified OpenWorks polygon set (defect 896695).
3. OpenWorks: added external curve name to the real-time monitoring curves report (defect 896394).
4. Shapefiles: corrected .prj contents for WGS84 shapefiles (defect 896658).
5. QC/QA: report count of rows returned in all cases including where reports are truncated to `WOW_MAXPOINTS` rows.

Version 5000.0.1.5

WOW 5000.0.1.5 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. OpenWorks: added option to display fault centerline sets with image, data values, and optional shapefile generation (defect 878980).
2. OpenWorks: added original coordinates and CRS to the well header page and dropped DMS attributes. Also added original CRS to 2D line pages (defect 873464).

3. OpenWorks: added additional queries to check for well header denormalization issues for spud/completion dates and formation at TD.
4. OpenWorks: added additional attributes to well location page (country, state, county, on/offshore flag) and to the real-time monitoring curves report (increment, depth units and mode).
5. OpenWorks: fixed issue when displaying well coordinates for IPs with a geographically-projected PDB (defect 886789).
6. OpenWorks: fixed issue saving results in Project Comparison module for log/pick/checkshot comparison types (defect 887649).
7. OpenWorks: fixed error displaying symbols outside of the default Z01-Z110 range (defect 891470).
8. GeoProbe: change project/survey header page to not display entries for data types without directories (defect 889315).
9. `HrzImage`: added horizon name to output file name (defect 888693).
10. SeisWorks: fixed error in creating live trace outlines for very large bricked/compressed seismic volumes (defect 891791).

Version 5000.0.1.4

WOW 5000.0.1.4 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. Shapefiles: added option to generate WGS84 shapefiles of all IP outlines in WOW or via command-line '`ow2shp OWSYS`' utility (defect 885936).
2. Shapefiles: added WOW URL to well/line/survey WGS84 shapefiles and line/survey projected shapefiles (defect 880552).
3. `Ow2shp`: fix issues where surveys have different original CRS to the project (defect 875566).
4. OW: improve Project Summary page performance by changing count queries for VC/R tables (defect 883065).
5. KRS: added `loadKRSDocuments` script to load simple well/line/survey document URLs (defect 882980).
6. SeisWorks: changed selection and labels to use seismic volume name and version rather than file name, in multiple locations (defect 872340).
7. SeisWorks: added optional `SEISWORKS_GROUPING` to `wow.env`: set to 'project' to group by project, 'survey' to group by survey type, which is the default (defect 879695).
8. SeisWorks: fix issue generating live trace outline in browser for surveys with spaces in the name.
9. `SeisLTO`: added <all> option to GUI to process all surveys for a project; for command-line version, specify survey as 'All3D' (defect 880941).
10. ZM: added options to show all MFD internal files / ZGF internal pictures within a directory, in a single page (defect 880109).

Version 5000.0.1.3

WOW 5000.0.1.3 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. QC/QA: clearly annotate certain queries that are only applicable on project databases, e.g. orphan vector detection queries (defect 875442).
2. Subscriptions: trap login failure if the executing user does not have access to a particular instance (defect 875555).
3. Horizon Summary: fix bug displaying thumbnails if survey names have spaces.
4. Project Comparison: modify behavior in cross-instance comparison to always show all projects, ignoring `OW_DISTRICT_FILTER` (defect 877371).
5. KRS: ensure web links always start with `http://`.
6. Faults: fix issues with filtering and savings results (defect 978831).
7. Error report and start page: report if Oracle user from wallet is not the same as the WOW Apache user.
8. Seismic/Horizon: improved error messages if external files not readable.
9. `CRSConvert`: handle (skip) and blank lines in the input file (defect 880038).
10. `SeisStats`: fix trace counts for newly-created 3dv volumes.
11. `SeisLTO`: fix for exact algorithm `hzdcls` error.

Version 5000.0.1.2

WOW 5000.0.1.2 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.8.0.0 and above.

1. Port to OpenWorks 5000.8.0.0 (version 9) libraries.
2. Added generic coordinate conversion capability to convert between any two cartographic reference systems (projected or geographic) with the following functionality:
   - single-point conversion via WOW browser
   - `crsConvert` command line utility for single-point conversion
   - `listcrsids` command line utility to list projected and basis CRSs
   - `fileCrsConvert` command line utility for file-based conversions
   - `CrsConvert` GUI for multiple point file-based conversions.
3. Standardized coordinate precision as 3 dp for XY and 8 dp for Lat/Lon.
4. Added coordinate conversion to IP well header XY coordinates (defect 841472).
5. Added link to display query descriptions in the QC/QA cross-project mode (defect 872544).
6. Fixed error with `hrzStats3D`/`HrzStats3D` utility introduced in OpenWorks 5000.0.3.0 (defect 871760).
7. Modified `WebAppsUpgrade` script to report htdocs links for recreation (defect 867986).
8. Fixed date-related error in well matching module (defect 871974).

Version 5000.0.1.1

WOW 5000.0.1.1 is an update, which does not require re-installation of the WebApps software tree. This update is compatible with OpenWorks 5000.0.3.0 and above.

1. Added support for Oracle 11 with OpenWorks 5000.0.3.5.
2. Added optional district support for Z-MAP Plus, Other Data, GeoProbe and VIP modules, i.e. restrict displayed data based on current district selection (defect 856038).
3. Added support for GeoProbe V2 ascii/binary horizon file formats (defect 850103).
4. Added sorting of results by name throughout the GeoProbe module.
5. Added LAS viewer improvements: handle up to 250 curves, handle curve names greater than 8 chars, plot curves in a grid rather than a long row (defect 861486).
6. Changed OpenWorks LAS export page to handle curve names greater than 8 chars (defect 862058).
7. Changed date format of spud/completion date in OpenWorks well header page to allow sorting by date (defect 858822).
8. Added ability to display image of .dts mapping files contain fault polygons and no grid; added support for display of .dts files produced in R5000 (defect 863947).
9. Changed SeisWorks seismic long remark add page to only allow addition of existing remark types for the project, which are not already in use for the current data set (defect 859799).
10. Improved performance on SeisWorks survey detail page; added option to filter by project type and survey type (defect 860934).
11. Added command-line arguments to `plist` utility for survey type and project type.
12. Fixed error with `seisStats`/`SeisStats` utility introduced in OpenWorks 5000.0.3.0 (defect 858077).
13. Fixed WOW cosmetics issue in top and side bars when using Internet Explorer 6 or 7 (defect 857223).

Version 5000.0.1.0

Important note: WOW 5000.0.1.0 is a point product release, requiring re-installation of the WebApps software tree. WebApps 5000.0.1.0 is compatible with OpenWorks 5000.0.3.0 and above.

1. Port to OpenWorks 5000.0.3.0 (version 8) libraries.
2. Cosmetic redesign with new style sheets.
3. Added a `WebAppsUpgrade` script as an alternative to `WebAppsInstall`, allowing existing WebApps 5000.0.0.x sites a simple upgrade without reinstall to 5000.0.1.
4. Added a Real-Time Monitoring module for viewing OpenWire data, launched from the OpenWorks Project Summary page (defect 849790).
5. Added a Well Planning Projects module launched from the OpenWorks Project Summary page (defect 742326).

6. Added a Well Status page displaying well symbols, launched from the OpenWorks Project Summary page.
7. Added a Well Location page, launched from the Well Summary page (defect 853278).
8. Added option to the “Lat/Lon ⇔ XY Calculator” to support conversion to and from WGS84 (defect 850172).
9. Automatically display ZGF picture thumbnails, if generated by CDA `ZgfThumbs`, when browsing OpenWorks project external data ZGF directory (defect 849517).
10. Added datum and replacement velocity, and optional display of interpretation project selection criteria, on the OpenWorks Project Summary page.
11. Added option to “Show all well details” in a single table with export to Excel on projects with greater than 1,000 wells (defect 844465).
12. Added option to “Show all document details” in a single table.
13. Added list creation options in the QC/QA module for horizons and 2D/3D navigation; added support for well location, with new QC/QA queries to illustrate.
14. Added automatic hyperlinking for wells/fields/leases in OpenWorks stored queries.
15. Added better support for hardcopy KRS document location attribute (defect 849960).
16. Added “Create project KML file” link to the OpenWorks module.
17. Fixed error in “Map all navigation” for 2D lines for IPs only (defect 854317)
18. Display converted X/Y coordinates for wells in interpretation projects with CRS different from the project database (defect 841472).
19. Fixed error in certain position log displays (defect 853942).
20. Changed the OpenWorks "Search across Projects" well results to honor environmental variable WELL_NAME_SQL (defect 853989).
21. Fixed issue displaying seismic images for certain SeisWorks lines with non-zero datum; datum shifts are now noted and handled correctly (defect 853997).
22. Changed VIP module to list VDBs alphabetically; fixed intermittent plot image error.
23. Changed OpenWorks seismic filter and SeisWorks “Search across projects” to use data set name rather than file name (defect 855332).
24. Fixed various hyperlink issues when using the OpenWorks/SeisWorks Faults module.
25. Added Fault Segment value display and download in the OpenWorks/SeisWorks Faults module (defect 778953).

Known Problems

The addition of attributes to the Live Trace Outline shapefile dbf output (version 5000.0.1.8, defect 904045/6) means that preexisting shapefiles cannot be appended, they must be recreated.

When running the SeisLTO GUI over multiple volumes, check that 'Overwrite' is set to 'Yes'. For command-line versions of this module, specify the 'clobber' flag.

When running through the WOW browser, the error o`w_seismic_lto.cgi: seisLTO: sdl_seis3dmap: output_shape: error in function` may be encountered in this scenario, with additional diagnostic information in the 'Errors' report: `shape_output: dbf file <full path> already exists but has 13 fields, 17 required`. When deleting old version shapefiles, note that there are three operating system files per shapefile, e.g. `lto.shp`, `lto.shx`, `lto.dbf`, all of which should be removed.

Pre-Installation Planning

Minimum Requirements

The minimum requirement for the WOW server is:

Server Hardware: Intel Pentium IA32 or X86_64 processor, 2 GB RAM, 4 GB swap, 200 MB disk space for software installation.

Server Operating System: Red Hat Enterprise Linux 4 or 5.

Server Application Software: Apache version 2, OpenWorks R5000.0.3.x.

Important note: WOW does not work with SELinux. SELinux must be disabled.

Note that WOW is a server-side application. There is no client-side (Web browser) installation or configuration:

Client Hardware: not restricted

Client Operating System: not restricted. Windows is preferred, but not mandated.

Client Web Browser: Internet Explorer version 7 or above, Mozilla Firefox version 1.0 or above.

See Appendix 3 for a description of the product architecture.

Other Pre-installation Considerations

Reinstallation of the WebApps tree is required for R5000, there is no upgrade path. For sites with R2003 WebApps, having the old conf directory available for comparison may help with the installation process.

Before installing, you need to choose or confirm the following:

1. A system on which to run the Apache server.

2. Apache is usually, but not always, installed with the operating system.
   If installed, directory `/etc/httpd` will exist. To confirm that Apache is installed, type:
   ```
   prompt> rpm -qa | grep httpd
   ```
   There should be a number of Apache packages installed. If not found, please request your System Administrator obtain and install it – see Appendix 4 for more details.

3. Apache may not be running on the selected system. If Apache is running, i.e. from a previous installation of WOW, you must stop it before continuing (as root):
   ```
   prompt> /usr/sbin/apachectl stop
   mv /etc/httpd/conf/httpd.conf /etc/httpd/conf/httpd.conf.orig
   ```

4. An install location, typically `$OWHOME/WebApps`, but may be any NFS-exported filesystem, e.g. `/apps/WebApps`.

5. A user who will run the Apache server. **This should be a user with read-write (interpret) access to the OpenWorks projects** – typically a data loader or administrator. Do NOT use `root` or `oracle` for security reasons. Run the install script as this user, from within an OpenWorks environment.

6. The domain name for the site. This will default correctly during installation if the site uses DNS to allow the resolving of domain names. To test this, type:
   `nslookup <hostname>`
   in a Linux xterm or at the DOS command prompt. The value returned by the Linux `domainname` command is *not* the correct domain name. If `nslookup` returns an error, you will need to determine whether the host name is visible across the site network. To do this, type
   `ping <hostname>`
   from a DOS prompt on a PC. If the host is recognized, use the host name with no domain specified; if not, use the full IP address obtained from the local `/etc/hosts` file or from NIS using the Linux command:
   `ypcat hosts | grep <hostname>`.

7. Root access is required to execute the `root.sh` script for Apache configuration.

8. See Appendix 4 if you require anything other than a single standard Apache root installation. Appendix 4 discusses options for customizing the Apache installation, such as using an existing Apache server, changing server name or port, running multiple instances, using alternative authentication methods etc.

Licensing

WOW uses standard FlexLM licensing with a feature name of `WOW`. The Web interface to the product simulates a typical user session using the FlexLM 'linger' function. Whenever a user clicks on a link in WOW, the license is refreshed for a further 15 minutes. The license is checked back in after 15 minutes of inactivity, without the user needing to logout or close the browser.

Note that linger applies only to Web modules, not command-line utilities.

See the R5000 installation instructions and Release Notes for how to install licenses, and/or email license@lgc.com to obtain a valid license key.

Installation

The latest WOW point product release can be obtained by electronic delivery using the Landmark Software Manager (requires PeopleSoft login and password). The downloadable `setup.tar.gz` file is listed under the product name WebApps, and includes WOW, Corporate Data Archiver, and Project Administrator. Alternatively, the media can be obtained on DVD.

The release requires re-installation (new sites) or upgrade (existing sites) of the WebApps software, as described below.

Upgrading WebApps using InstallAnywhere (existing sites only)

- Download the `setup.tar.gz` file using the Landmark Software Manager (requires PeopleSoft login and password), or obtain it from DVD.
- Login to the WebApps server as the current WebApps software tree owner.
- Source the OpenWorks environment if not done by default:
  ```
  prompt> source $OWHOME/templates/.lgclogin        (if C shell)
  prompt> . $OWHOME/templates/.lgcprofile           (if Bourne shell)
  ```
- Extract and run the installer:
  ```
  prompt> gzip -dc setup.tar.gz | tar xf -
  prompt> sh setup.bin
  ```
- Continue through the installation wizard, accepting license terms and confirming the existing `OWHOME` and `WOW_HOME` locations. The installer will rename the current WebApps directory, create a new WebApps directory and extract the new media into it, then launch the `WebAppsUpgrade` upgrade script to copy the main configuration files from the old to the new WebApps directory. No additional Apache configuration is required; the existing Apache server will be utilized.

Installing WebApps using InstallAnywhere (new sites only)

The overall installation process consists of installing the latest point product release, then applying any subsequent patches or updates, as described in this section.

- Download the `setup.tar.gz` file using the Landmark Software Manager (requires PeopleSoft login and password), or obtain it from DVD.
- Login to the chosen server as the chosen user.
- Source the OpenWorks environment if not done by default:
  ```
  prompt> source $OWHOME/templates/.lgclogin        (if C shell)
  prompt> . $OWHOME/templates/.lgcprofile           (if Bourne shell)
  ```
- Extract and run the installer:
  ```
  prompt> gzip -dc setup.tar.gz | tar xf -
  prompt> sh setup.bin
  ```

- Continue through the installation wizard, accepting license terms and confirming `OWHOME` and `WOW_HOME` locations. After the files are extracted, continue with the `WebAppsInstall` installation script as documented below.

Important note: the WebApps post installation script can be re-run if required, i.e. without rerunning the InstallAnywhere installer:

```
cd $OWHOME/WebApps/install
./WebAppsInstall –o $OWHOME
```

Stage 1 – Installation Parameters

The `WebAppsInstall` script is wrapper to allow selection of which WebApps application to install. Select option 1 to install WOW.

```
      WebApps Configuration R5000.0
   ================================================

      Install WOW (required 1st step)             1
      Install Corporate Data Archiver             2
      Install Project Administrator               3
      EXIT ..................................     0

   Please enter option=> 1
```

After an environmental check, the installation script prompts for the following parameters:

- **WOW Apache server host:** the name of the system on which Apache will run: see pre-installation considerations. This is referred to as <`hostname`> hereafter.
- **WOW Apache server URL:** if DNS is configured this will default correctly, if not, enter `http://<hostname>`.
- **WOW Apache user:** defaults to the user name you are using to run the install script: this should be a user with read-write access to the OpenWorks projects – typically a data loader or administrator.
- **WOW Apache user default group:** the default group of the user running Apache. Enter the primary group for the WOW user.
- **WOW administration group:** enter the Linux group for a privileged group of users who can do WOW configuration through the browser. To disable browser-based configuration file editing, set this to a non-existent group.
- **ORACLE_HOME:** the ORACLE_HOME location, default taken from the environment. Confirm the default value.
- **ORACLE_SID:** the ORACLE_SID location, default taken from the environment. Confirm the default value.
- **LM_LICENSE_FILE:** the location of the OpenWorks license file, defaults to `$OWHOME/lam/license.dat` if not set in the environment.

- **Apache administrator's email:** this email address is used in error messages when Apache has internal errors. Specify the system administrator's email.

- **Company email suffix:** the part of your company email addresses following the @ symbol, e.g. `shell.com`

- **Data administrator's email:** a comma-separated list of email addresses for the data administrators, to whom error form output will be sent. The forms will only work if email is configured to work internally – see the Notes on WOW email section.

- **SMTP mail server:** address of the mail server used for outgoing SMTP email. This can usually be found by typing `nslookup mailhost`, e.g. `mailhost.shell.com`. If not present it will default to host name.

- **Security level (B or C):** Level B provides universal read without authentication, but authenticates any write actions. Level C authenticates all access. See the Security section for more detail.

- **Parent directory for WebApps exports:** enter a parent directory for WOW to use for subscription output, exported shapefiles, geo-referenced images, ZGFs, LAS files etc.

- **Review:** check the options specified; and re-run if there are any errors.

Important note: the OpenWorks configuration directory setting `$OW_CONF_DIR` will be included automatically in the `wow.env` file, if set within the environment of the installer.

During this stage the `$OWHOME/WebApps/conf/wow.env` file is created containing all the variables required by WOW. This is the single most important configuration file for WOW; see Appendix 1 for an example and Appendix 2 for a list of all configuration files.

During this stage the installation script also modifies environmental variables and URLs in the WOW tree, and creates links for various devkit shell utilities. See Appendix 5 for further background on the devkit shells.

Stage 2 – Apache Configuration

Important note: see Appendix 4 for non-default installation options, including bypassing this Apache configuration step, i.e. if wanting to use an existing Apache server.

The installation of Apache must be run as root. This step configures the main Apache configuration file `httpd.conf`, then creates a `'root.sh'` file for execution as root in a separate xterm. The selected system may not already running Apache and the default port of 80 must be available.

The `root.sh` script does the following:

- Copies `httpd.conf` into the Apache configuration directory `/etc/httpd/conf`.

- Starts Apache

- Creates an example password file in the Apache configuration directory, containing the installation user only (with same username as password) and further configures WOW for level B or C security. See the Security section for more detail.

- Copies the WOW default `index.html` to the Apache web root directory.

- Copies the WOW `favicon.ico` to the Apache web root directory.

Run `$OWHOME/WebApps/install/root.sh` as root before continuing. There should be a message indicating that Apache has started on the server.

Stage 3 – Finalizing the Install

Configuring WOW_DATA_DIR directories: directories for subscription output and other WOW exports are automatically created beneath `$WOW_DATA_DIR`. The subscription directory will also be linked to `$OWHOME/WebApps/htdocs/wow_reports`. See the Subscription section later in this document.

A message will indicate complete installation. To check the installation, run `mozilla` or other Linux browser, typing in the indicated URL, e.g. `http://<hostname>.<domain>`. To test PC connectivity, try the same URL in a PC browser. If level C security was selected, you will be prompted for username and password: use the WOW username for both.

Once the license is installed and any required Oracle 11 changes are made (see below) WOW should be fully functional. See the Troubleshooting section if errors are encountered.

Oracle 11 Notes

This section is applicable only to sites running OpenWorks 5000.0.3.5 or above, using Oracle version 11.2.0.2. Oracle 11 client does not include required 32-bit libraries, i.e. there is no `$ORACLE_HOME/lib32` directory. Instead, OpenWorks provides the Oracle 11 32-bit libraries in its 'Instant Client' location, `$OWHOME/oracle32/instantclient`.

This requires three changes in wow.env, to `ORACLE_HOME`, `ORACLE_LIBRARY` and `LD_LIBRARY_PATH`, e.g.:

old: `ORACLE_HOME=/apps/oracle/OraHome1`
new: `ORACLE_HOME=/apps/oracle/product/11.2.0/dbhome_1`

old: `ORACLE_LIBRARY=${ORACLE_HOME}/lib32/libclntsh.so`
new: `ORACLE_LIBRARY=${OWHOME}/oracle32/instantclient/libclntsh.so.11.1`

old: `LD_LIBRARY_PATH=`
`${OWHOME}/lib:${ORACLE_HOME}/lib32:${WOW_HOME}/tcltk/lib`
new: `LD_LIBRARY_PATH=`
`${OWHOME}/lib:${OWHOME}/oracle32/instantclient:${WOW_HOME}/tcltk/lib`

Note that `${OWHOME}/SeisWorks/lib` is no longer required and may be removed from `LD_LIBRARY_PATH`.

Configuring Districts

Support for districts – collections of project data typically based on geographic or business unit criteria – is provided by OpenWorks in R5000. No additional configuration is required within WOW. Districts are listed in the OpenWorks configuration directory `$OW_CONF_DIR` (typically `$OWHOME/conf`) `district.dat` file.

The district is set on a per-client basis by clicking on 'Change District/SID' on the WOW top bar. This sets a cookie that stores the district name locally and 'remembers' it until changed by any user on the same client. This option will also change the OWSYSSID (OpenWorks Oracle instance) to match that specified for the chosen district.

Patching the Installation

WebApps patches (bug fixes only) and updates (bug fixes and minor enhancements) are designed as simple compatible additions or replacements of existing files in the software directories. They are provided as compressed tar files, available for download from the Landmark Software Manager.

Before installing any WebApps patch or update, please see the associated README for detailed installation instructions. This README is available alongside the patch on the Landmark Software Manager by clicking the `Install Guide` icon.

Current version can be obtained by clicking on 'About' on the WOW browser interface.

Release/Update/Patch history:

5000.0.0.0 – foundation release compatible with OpenWorks 5000.0.0.1 (March 2008)

- 5000.0.0.1 – update compatible with OpenWorks 5000.0.0.2 (June 2008)
- 5000.0.0.2 – update compatible with OpenWorks 5000.0.0.3 (October 2008)
- 5000.0.0.3 – update compatible with OpenWorks 5000.0.0.3 (December 2008)
- 5000.0.0.4 – update compatible with OpenWorks 5000.0.1.0 (March 2009)
- 5000.0.0.5 – update compatible with OpenWorks 5000.0.1.0 (June 2009)
- 5000.0.0.6 – update compatible with OpenWorks 5000.0.1.0 (September 2009)
- 5000.0.0.7 – update compatible with OpenWorks 5000.0.2.0 (December 2009)
- 5000.0.0.8 – update compatible with OpenWorks 5000.0.2.0 (March 2010)
- 5000.0.0.9 – update compatible with OpenWorks 5000.0.2.0 (June 2010)
- 5000.0.0.10 – update compatible with OpenWorks 5000.0.2.5 (September 2010)
- 5000.0.0.11 – update compatible with OpenWorks 5000.0.2.5 (December 2010)

5000.0.1.0 – point product release compatible with OpenWorks 5000.0.3 (February 2011)

- 5000.0.1.1 – update compatible with OpenWorks 5000.0.3.0 (May 2011)
- 5000.0.1.2 – update compatible with OpenWorks 5000.8.0.0 (September 2011)
- 5000.0.1.3 – update compatible with OpenWorks 5000.8.0.0 (December 2011)
- 5000.0.1.4 – update compatible with OpenWorks 5000.8.0.0 (March 2012)

5000.0.1.5 – update compatible with OpenWorks 5000.8.0.0 (June 2012)

5000.0.1.6 – update compatible with OpenWorks 5000.8.0.0 (September 2012)

5000.0.1.7 – update compatible with OpenWorks 5000.8.0.0 (December 2012)

5000.0.1.8 – update compatible with OpenWorks 5000.8.0.0 (March 2013)

5000.0.1.9 – update compatible with OpenWorks 5000.8.3.01 (June 2013)

5000.0.1.10 – update compatible with OpenWorks 5000.8.3.01 (September 2013)

5000.0.1.11 – update compatible with OpenWorks 5000.8.3.01 (March 2014)

Compatibility matrix:

Important note: dynamic libraries in OpenWorks R5000 introduce a strong dependency between OpenWorks and WebApps versions, as summarized in the table below.

WebApps version	Release date	OW library version	Minimum OpenWorks version*
5000.0.0.0	Mar-08	1	5000.0.0.1
5000.0.0.1	Jun-08	2	5000.0.0.2
5000.0.0.2	Oct-08	3	5000.0.0.3
5000.0.0.3	Dec-08	3	5000.0.0.3
5000.0.0.4	Mar-09	4	5000.0.1.0
5000.0.0.5	Jun-09	4	5000.0.1.0
5000.0.0.6	Sep-09	4	5000.0.1.0
5000.0.0.7	Dec-09	6	5000.0.2.0
5000.0.0.8	Mar-10	6	5000.0.2.0
5000.0.0.9	Jun-10	6	5000.0.2.0
5000.0.0.10	Sep-10	6	5000.0.2.5
5000.0.0.11	Dec-10	6	5000.0.2.5
5000.0.1.0	Feb-11	8	5000.0.3.0
5000.0.1.1	May-11	8	5000.0.3.0
5000.0.1.2	Sep-11	9	5000.8.0.0
5000.0.1.3	Dec-11	9	5000.8.0.0
5000.0.1.4	Mar-12	9	5000.8.0.0
5000.0.1.5	Jun-12	9	5000.8.0.0
5000.0.1.6	Sep-12	9	5000.8.0.0
5000.0.1.7	Dec-12	9	5000.8.0.0
5000.0.1.8	Mar-13	9	5000.8.0.0
5000.0.1.9	Jun-13	9.1	5000.8.3.01
5000.0.1.10	Sep-13	9.1	5000.8.3.01
5000.0.1.11	Mar-13	9.1	5000.8.3.01

* Note: OpenWorks is backward compatible with WebApps, but not vice versa, i.e. OpenWorks version determines the WebApps version. For example: a site running OpenWorks 5000.8.1.x may run any WebApps version up to and including 5000.0.1.8, but may not install 5000.0.1.9.

This is the end of the compulsory installation process.

To modify the default security sections or to add additional users, read the Security section.

If the site uses Z-MAP Plus, GeoProbe, VIP, ProMAX or AssetJournal, read the Configuring Other Landmark Applications section.

Configuring Security Options

This section applies to the WOW browser client only. All WOW command-line and GUI utilities obeys identical Oracle and Linux file permissions as any other OpenWorks or SeisWorks utility.

All WOW operations are actually executed by the WOW Apache user. Security levels as described below only emulate end user access. To perform a particular operation in WOW, both the WOW Apache user and the end user must have legitimate access.

There are two different options for implementing security in WOW: full emulation of user access requiring authentication/authorization for all operations (level C), and open read access, requiring authentication only for write operations, e.g. creating well lists (level B).

Security Levels

Level B – Universal read-only access with emulation on write functionality:
This provides full emulation but only on the write-back modules (e.g. creating well lists, adding/deleting KRS documents). Any user that can login to any system over the company network can access all OpenWorks, SeisWorks and other data, read-only, except for named exclusions. Universal browsing is thus encouraged without having to provide a password, but as soon as an attempt is made to write back to the database (e.g. loading a KRS document), the user is prompted for a login and password. This is the default security level.

Level C – Full emulation:
Users are required to login at all times. The authenticated username is then used to authorize access at an individual project level, exactly as if the user is logging on to a Linux workstation in the site. This is as secure as the underlying applications, but at the expense of extra administration to maintain the password file. Extra administration is also required to grant casual (non-OpenWorks) users access. To access WOW, a casual browser must:

- have a Linux account
- be added to Oracle as an internal user
- be granted at least BROWSE access to the required OpenWorks projects
- be granted read access to external data directories

Named Exclusions

Specified 'tight' projects can be restricted entirely from being viewed in WOW, irrespective of security level. Access is restricted to projects and directories by modifying files in the `$OWHOME/WebApps/conf` directory as described below.

OpenWorks: modify the `OW_PROJ_WHERE_CLAUSE` in `wow.env` to restrict projects to those that have a particular name or comment. Modifying this requires a degree of SQL knowledge; contact support if in doubt.

SeisWorks: the `restricted_plist.dat` file lists the names of any 'tight' SeisWorks surveys. They will appear in listings but will not be further accessible.

Z-MAP Plus/Other: the `restricted_dir_list.dat` file lists the names of any 'tight' Linux directories. These will appear in listings but will not be further accessible.

Adding Users to the Apache Password File

A default password file is created during installation with only the install user added. Adding additional users **requires root access** for permission to edit the password file `/etc/httpd/conf/.wp`.

Updating the password file using ypcat. The format for the password file is identical to that of a Linux `passwd` file, except that only the first two fields (user and encrypted password) are used. Apache uses the same `crypt` function as Linux, so one method of adding users is:

```
prompt> ypcat passwd > /etc/httpd/conf/.wp
```

If using this method, edit the file and delete users based on criteria such as group membership etc. It is not considered secure to use the actual `/etc/passwd` file itself.

It is the site's responsibility to keep the password file up-to-date, e.g. by scheduling a cron job to refresh it at regular intervals.

For additional security, the password file name and location can be changed, and made readable by the Apache server user only.

Updating the password file manually. To add new users manually using the `htpasswd` facility, e.g. to add user demo, passwd demo:

```
prompt> /usr/bin/htpasswd –b /etc/httpd/conf/.wp demo demo
```

Use the additional `–c` flag when creating a new passwd file, or `–help` for complete usage.

Integrating with NIS. If a site uses NIS, it is possible to authenticate directly using an optional Apache module - see Appendix 4 for details.

Changing Security Level between B and C

Two steps are required to switch from B to C security and vice-versa:

1. **Modify the .htaccess file:** Edit the `$OWHOME/WebApps/cgi-bin/.htaccess` file. For level C security, comment the `<FilesMatch></FilesMatch>` lines. For level B security, uncomment the `<FilesMatch></FilesMatch>` lines.

   ```
   prompt> cd $OWHOME/WebApps/cgi-bin
   prompt> vi .htaccess
   ```

   ```
   # For level C security comment <FilesMatch></FilesMatch>
   #<FilesMatch “(input|delete)\.cgi$”>
      AuthType basic
      AuthName "WOW Linux" (a descriptive name for the authorization form)
      AuthUserFile "/etc/apache2/.wp"
      Require valid-user
   #</FilesMatch>

   # For level B security uncomment <FilesMatch></FilesMatch>
   <FilesMatch “(input|delete)\.cgi$”>
      AuthType basic
      AuthName "WOW Linux" (a descriptive name for the authorization form)
      AuthUserFile "/etc/apache2/.wp"
      Require valid-user
   ```

```
</FilesMatch>
```

2. **Update wow.env:**
   `prompt> vi $OWHOME/WebApps/conf/wow.env`
   and change `SECURITY_LEVEL` to B or C.

Protecting 'Static' Documents

The WOW security model is largely aimed at preventing access to dynamic pages created on the fly in WOW. This section explains how to protect certain static documents, e.g. an AssetJournal project, which requires selective security. The restricted dir list mechanism described earlier in this section provides blanket protection for certain directories, but even legitimate users cannot get to these directories.

One possibility is to set up a custom `.htaccess` and password file for the specified directory. Apache will then authenticate all access to static files in that directory. Notes that this will have no effect on WOW dynamic pages, e.g. Z MAP Plus browsing. To implement:

1. **Create a password file.** Use the htpasswd utility to create a passwd file. The example below creates a file called `ajpasswd` with user 'tight', passwd 'aj2001':
   `prompt> htpasswd –bc /etc/apache2/.ajpasswd tight aj2001`

2. **Create an .htaccess file.** Create a file with contents as listed below:
   ```
   AuthType basic
   AuthName "Tight AJ Projects"
   AuthUserFile "/etc/apache2/.ajpasswd"
   Require valid-user
   ```

3. **Copy .htaccess to the required directory.** Place the file into all directories that require the same security policy.

4. **Configure Apache to recognize the .htaccess file:**
   `prompt> vi /etc/httpd/conf/httpd.conf`
   Change `AllowOverride` from `None` to `AuthConfig` within the `<Directory />` stanza.

5. **Restart Apache:**
   `prompt> /usr/sbin/apachectl restart`

Configuring Other Landmark Applications

Z-MAP Plus / Other Data

Unlike OpenWorks and SeisWorks which have strong project management, Z-MAP Plus and some other data can be widely scattered in different locations.

WOW needs to know where to look for these data. The methodology employed is to maintain a list of parent directories in configuration files in `$OWHOME/WebApps/conf`.

For Z-MAP Plus, the directories specified are simply start points for directory browsing, i.e. no project structure is assumed. To configure, add directories to `zmap_projdirs.dat`:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp zmap_projdirs.dat.default zmap_projdirs.dat
prompt> vi zmap_projdirs.dat
```

… and add top-level directories for browsing in WOW, e.g.:

```
##############################################################################
#
# This file contains a list of project directories for Z-MAP Plus.
# File format:
# - directory (required)
# - district (optional; use 'all' if shared between districts)
#
##############################################################################
/data1/gom/zmap    GOM
/data2/int/zmap    INT
/data3/misc/zmap   all
```

An identical concept is provided for 'Other Data', e.g. directories containing SEG-Y, LAS, CGM, DGN, Shape, DBF and general ASCII and Web files; `other_projdirs.dat`:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp other_projdirs.dat.default other_projdirs.dat
prompt> vi other_projdirs.dat
```

… and add top-level directories for browsing in WOW.

Alternatively, members of the `WOW_ADMIN_GROUP` can configure both these files through the browser by clicking on 'Admin' on the WOW top bar.

ASCII/Web files: Both these modules also cater for two special categories of files:

- files that are composed only of ASCII characters
- files that are universally recognized by Web browsers, e.g. with extensions of `.html`, `.gif`, `.jpg` etc. These are referred to as mime types.

If there are ASCII file types (e.g. `.vel` for velocity surveys) which should be viewed through WOW, do the following:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp ascii_file_extensions.dat.default ascii_file_extensions.dat
prompt> vi ascii_file_extensions.dat
```
And add in file extensions as required.

A similar approach can be adopted for common mime types using the file `$OWHOME/WebApps/conf/web_file_extensions.dat`. Members of the `WOW_ADMIN_GROUP` can configure both these files through the browser by clicking on 'Admin' on the WOW top bar.

GeoProbe

As with Z-MAP Plus, GeoProbe projects can be widely scattered across filesystems; GeoProbe does not have a strong 'project' structure like OpenWorks. WOW needs to know where to look for these data.

The WOW for GeoProbe module uses two methods to identify GeoProbe projects. Type `GP` projects exist beneath any of the parent directories listed in the `gp_projdirs.dat` configuration file in `$OWHOME/WebApps/conf`. The directories must be direct parent directories of GeoProbe projects:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp gp_projdirs.dat.default gp_projdirs.dat
prompt> vi gp_projdirs.dat
```
… add parent directories of GeoProbe projects, e.g.:

```
################################################################################
#
# This file contains a list of project directories for GeoProbe.
# File format:
# - directory (required)
# - district (optional; use 'all' if shared between districts)
#
################################################################################
/data1/gom/geoprobe    GOM
/data2/int/geoprobe    INT
/data3/misc/geoprobe
```

Type `OW` projects are OpenWorks-linked; they exist beneath any of the OpenWorks external storage directories listed in `owdir.dat`, e.g. `<owdir.dat entry>/OW_PROJ_DATA/<OpenWorks Project>/GeoProbe`.

WOW for GeoProbe does not use the home directory-based `projects.dat` file.

VIP

As with Z-MAP Plus VIP data can be widely scattered across filesystems. WOW needs to know where to look for these data. The methodology employed is to maintain a list of parent directories in configuration files in `$OWHOME/WebApps/conf`.

For VIP, the directories specified must be parent directories of VDB files/directories:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp vip_projdirs.dat.default vip_projdirs.dat
prompt> vi vip_projdirs.dat
```
…add parent directories of VIP VBDs, e.g.:

```
##############################################################################
#
# This file contains a list of project directories for VIP.
# File format:
# - directory (required)
# - district (optional; use 'all' if shared between districts)
#
##############################################################################
/data1/gom/VIP_data    GOM
/data2/int/VIP_data    INT
/data3/misc/VIP_data   all
```

Alternatively, members of the WOW_ADMIN_GROUP can configure these files through the browser by clicking on 'Admin' on the WOW top bar.

Important note: VIP VDB files/directories may also be viewed in WOW through the Z-MAP Plus/Other Data directory browsing modules.

ProMAX

To enable ProMAX data viewing in WOW, configure promax.env:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp promax.env.default promax.env
prompt> vi promax.env
```
…check that the ProMAX environment is correctly specified, particularly PROMAX_HOME, PROMAX_DATA_HOME and PROMAX_64BIT (1=64-bit, 0=32-bit).

Also, create a link from promaxsh32 or promaxsh64 to promaxsh in $OWHOME/WebApps/bin, e.g. for 64-bit:
```
cd $OWHOME/WebApps/bin
ln -s promaxsh64 promaxsh
```

Multiple PROMAX_DATA_HOME locations can also be configured. To implement:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp promax_data_homes.dat.default promax_data_homes.dat
prompt> vi promax_data_homes.dat
```
… add all PROMAX_DATA_HOME locations

If promax_data_homes.dat exists, a link will appear on the ProMAX area page to select or change location. If this file is not present, PROMAX_DATA_HOME is taken from promax.env.

Utility pmxGetAreas can be used as a test of whether ProMAX is correctly configured.

AssetJournal

AssetJournal projects contain web documents (using standard mime types such as html text and images) which are supported directly by the browser. This requires that files be addressable via a URL, i.e. they must reside below the Web root.

Location(s) for AssetJournal browsing: In some sites these data can be quite widely scattered, so WOW provides a convenient grouping mechanism. The parent location for AssetJournal is `$OWHOME/WebApps/htdocs/ assetjournal_data`. The directory should be created, and links created within this directory, to match the entries in a typical `$HOME/pjprojects.xml`, e.g.

```
prompt> mkdir $OWHOME/WebApps/htdocs/assetjournal_data
prompt> cd $OWHOME/WebApps/htdocs/assetjournal_data
prompt> ln -s <directorylocation> <directoryname>
prompt> ln -s /data1/AJ_Data/GOM GOM
prompt> ln -s /data2/AJ_Deepwater Deepwater
prompt> ln -s /data2/AJ_noshore Onshore
```

By creating and deleting links to data, directories may be simply exposed or hidden.

Publishing: AssetJournal 'publishing' is designed to allow the automatic sharing of AssetJournal projects in a two-tier system of 'working' vs. 'published' projects. The publication takes place in situ by creating a `.auto_publish` file in the project directory. The `.auto_publish` file is a simple ASCII file, which may be edited outside of WOW with any text editor. The format is illustrated below:

```
Title: AssetJournal Tutorial Project
Author: Andrew Greig
Date: 2001/08/14
Category: Support
Keywords: Landmark,AssetJournal,Badleys,support,tutorial
Description: This doc describes product usage, including the
Image drag&drop and text annotation functionality.
```

If this file is to be created outside of WOW, note the following points:

- a space is required after the ':' before the metadata itself
- keywords are comma-separated without spaces after the comma
- only the description may span multiple lines (must be last in the file).

OpenWorks/SeisWorks integration: Any AssetJournal project linked into `$OWHOME/WebApps/htdocs/assetjournal_data` (see exposing additional directories) or a single subdirectory level below, will appear as a hypertext link on the OpenWorks or SeisWorks project summary page in WOW, provided its name begins with (or matches) the name of the OpenWorks or SeisWorks project.

For example, if the SeisWorks survey is named mc3d, an AssetJournal project named `mc3d_dataloading_history` will automatically appear on the SeisWorks survey summary page. The name will be the internal AssetJournal title, rather than the project (directory) name.

Configuring Subscription Tools and Email

The subscription tools allows users to request automatic notification by email in the event that data are changed or added within a registered area of interest – by specified project, geographic area or data type.

These tools allow users to establish, view and modify their subscriptions directly through html forms. A series of cron jobs execute queries, which compose emails providing users with a list of new/changed data from WOW.

To configure the subscription tools, you need to set up a cron job to run as the Apache user. A default crontab is configured during installation, with contents in `$OWHOME/WebApps/install/wow_crontab`. This can be added manually to other users using the `crontab` command:

```
prompt> setenv EDITOR vi
prompt> crontab -e
  0 4 * * 2-6 /your/OWHOME/WebApps/bin/DoAllSubscriptions Daily
  0 4 * * 1   /your/OWHOME/WebApps/bin/DoAllSubscriptions Weekly
  0 4 1 * *   /your/OWHOME/WebApps/bin/DoAllSubscriptions Monthly
```

OpenWorks subscriptions are stored in the `OWSYS` schema in table `wow_ow_push`.

From version 5000.0.0.11, it is possible to execute ad hoc subscriptions which search for changes over a specified number of days, rather than just daily, weekly or monthly. This can be executed on the command-line or via cron using `DoAdhocSubscription`; or interactively from the Subscriptions window in the WOW browser.

```
prompt> DoAdhocSubscription
Usage: DoAdhocSubscription owproj ?days? ?email?
   ?min_lat? ?max_lat? ?min_lon? ?max_lon?
   ?wells? ?logs? ?picks? ?checkshots?
   ?leases? ?fields? ?nav? ?seismic? ?horizons? ?faults? ?docs?

prompt> DoAdhocSubscription TEAPOT_DOME 3 fred@oilco.com.com
Processing ad hoc subscription request (3 days) for fred on
TEAPOT_DOME
```

Notes on WOW Email

The subscription module described above, as well as data error forms, requires access to an SMTP (outgoing) mail server in order to correctly send email to relevant users. Prior to version 5000.0.0.11 `sendmail` was also used in places for mail transport; this is no longer supported.

The mail server is typically identified by a host alias of `mailhost`, i.e.:
`prompt> nslookup mailhost`

The mail server must be correctly identified to WebApps in the `wow.env` file in `$OWHOME/WebApps/conf`, e.g.:

```
# Address of SMTP mail server (usually 'nslookup mailhost')
WOW_MAILSERVER=smtp.oilco.com; export WOW_MAILSERVER
```

To test WOW email on the command-line, use the `testEmail` utility:

```
prompt> testEmail
Usage: testEmail <plain|html|sendmail> <email address>
Set WOW_DEBUG=1 for additional diagnostic information.

prompt> testEmail plain fred@oilco.com
'sendEmail plain' completed in 8 seconds.
Check fred@oilco.com inbox; most likely email has been delivered.

prompt> testEmail html fred@oilco.com
'sendEmail html' completed in 8 seconds.
Check fred@oilco.com inbox; most likely email has been delivered.
```

If configured correctly, the email should appear in your email client within a few seconds.

Email from the WOW server may also be tested in the WOW browser from the **Errors** link.

Customizing the WOW Interface

Although WOW will install and run 'out of the box', it is designed to form part of a larger subsurface E&P portal. For example, the portal would cover project databases via WOW, other internal databases, links to electronic document management systems, external links etc. WOW behaves identically to any other Web site that contains a combination of static and dynamic content. This means that WOW URLs can be called from or embedded in any other Web page.

Knowledge of html and Web authoring is required to create Web pages that invoke WOW components. The static pages and style sheets that provide the default WOW interface reside in `$OWHOME/WebApps/htdocs`. Halliburton recommends that you do NOT modify these files. Rather, create a new Web page that links to the relevant WOW page directly.

The 'home page' for the Apache installation is `/var/www/html/index.html`. This file is replaced with the WOW home page on installation, but any client-provided page may be used. In this case, the full WOW URL is `http://<host>.<domain>/wow/`, with the trailing slash required.

Changing the Color Scheme

WebApps 5000.0.1.8 introduces a choice of color schemes, which applies to all client browsers accessing the Apache server. The 'dark' and 'light' schemes broadly match the choice offered in OpenWorks and DecisionSpace. The default is 'dark'.

To change to light:

```
prompt> cd $OWHOME/WebApps/htdocs; cp wow_css.js.light wow_css.js
```

To change to dark:

```
prompt> cd $OWHOME/WebApps/htdocs; cp wow_css.js.dark wow_css.js
```

Note that browsers may cache both JavaScript and style sheet files, so that refreshing the browser may be required to get WOW to display correctly.

Changing Default Project Listings

In WOW R2003, the choice of district would determine the list of SeisWorks projects, and the choice of SID the list of OpenWorks projects. In R5000, each OpenWorks project belongs to a specific district.

In some sites it may be preferable for the choice of district to govern the OpenWorks project list, e.g. if there are multiple unrelated districts all sharing a single instance. To change the default behavior of listing all OpenWorks projects for the instance, set the environmental variable `OW_DISTRICT_FILTER` in the `wow.env` file, e.g.:

```
prompt> cd $OWHOME/WebApps/conf
prompt> vi wow.env
```

… uncomment and edit the lines below as required:

```
# Filter OpenWorks projects by current district,
# or display all for current SID (1=on 0=off)
OW_DISTRICT_FILTER=1; export OW_DISTRICT_FILTER
```

Up to version 5000.0.1.10 the default OpenWorks project listing is of project databases (PDBs). Since version 5000.0.1.11 this changes to a hierarchy mode which displays interpretation projects (IPs) beneath their associated PDB. For SeisWorks-mode survey listings, the default has changed from listing surveys in IPs by survey type, to by project.

These defaults may be changed by setting environmental variables `WOW_OW_LISTING`, `WOW_SW_LISTING` and `WOW_SW_GROUPING` in the `wow.env` file:

```
prompt> cd $OWHOME/WebApps/conf
prompt> vi wow.env
```

… uncomment and modify these environmental variables:

```
# OpenWorks/SeisWorks listing default: pdb, ip or all
#WOW_OW_LISTING=pdb; export WOW_OW_LISTING
#WOW_SW_LISTING=ip; export WOW_SW_LISTING

# SeisWorks group by default: project or survey
#WOW_SW_GROUPING=survey; export WOW_SW_GROUPING
```

Adding a Site Label

A site-specific label can be added to the WOW front page title, e.g. to change the default label from 'WOW R5000' to 'WOW R5000 – Houston Site':

```
prompt> cd $OWHOME/WebApps/conf
prompt> vi wow.env
```

… uncomment and modify the `WOW_SITE_LABEL` environmental variable:

```
# Optional site label for WOW front page
WOW_SITE_LABEL="- Houston Site"; export WOW_SITE_LABEL
```

Adding to the WOW Menu

The WOW left frame menu is partly customizable. This allows site administrators to add links directly into the WOW menu, by modifying a simple configuration file. See `$OWHOME/WebApps/conf/wow_menu.dat.default` for details.

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp wow_menu.dat.default wow_menu.dat
prompt> vi wow_menu.dat
```

```
################################################################################
#
# This file contains metadata for adding links to the WOW left frame
# It consists of the following tab-delimited fields:
#   Name: short name for the link, e.g. "Landmark Graphics"
#   URL: fully-specified URL, e.g. http://www.lgc.com
# Note: use double quotes for entries with a space in the name
#
################################################################################
"Landmark Graphics"       http://www.lgc.com
"Exprodat"                http://www.exprodat.com
"Company Home Page"       http://www.oilco.com
```

Alternatively, members of the `WOW_ADMIN_GROUP` can configure this file through the browser by clicking on 'Admin' on the WOW top bar.

Adding a 'Custom' Intro Page

If a file `wow_custom.html` exists in `$OWHOME/WebApps/htdocs`, a link to this page will appear on the WOW front page. This can be used to add site-specific content.

```
prompt> cd $OWHOME/WebApps/htdocs
prompt> cp wow_custom.html.default wow_custom.html
```

Edit `wow_custom.html` in any HTML authoring tool and add your desired content.

Changing Default Well Name Display

By default WOW displays wells using the common well name attribute `WELL_NAME_FREE`. The default can be overridden for the site by setting an environmental variable `WELL_NAME_SQL` in the `wow.env` file, e.g.:

```
prompt> cd $OWHOME/WebApps/conf
prompt> vi wow.env
```
… add line: `WELL_NAME_SQL="well_uwi"; export WELL_NAME_SQL`

The default is to use common well name unless null in which case UWI is used, i.e.:

```
WELL_NAME_SQL="nvl(well_name_free,well_uwi)";export WELL_NAME_SQL
```

The site administrator can provide any SQL fragment that is queryable as an attribute e.g.

```
"well_uwi"
"current_well_lease_name || ' | ' || current_well_lease_no"
"current_company || ' | ' || current_well_lease_no"
```

Note that the attribute is also used to control well display order. It is not possible to have per-user control over well name display format.

Adding Extra Well Header Attributes

Additional well header attributes from the `well_master` table may be displayed in the OpenWorks module, by setting an environmental variable `WELL_HEADER_EXTRAS` in the `wow.env` file, e.g.:

```
prompt> cd $OWHOME/WebApps/conf
prompt> vi wow.env
```
… uncomment and edit the lines below as required, e.g.:

```
# SQL to add extra attributes to WOW well header query
WELL_HEADER_EXTRAS='permit_no "Permit", data_acquisition_type
"Acquisition Type",'; export WELL_HEADER_EXTRAS
```

Note that the comma before the closing single quote is required.

Viewing R2003 and R5000 Project Summary Pages Side-by-Side

For the OpenWorks and SeisWorks modules, project summary pages may be viewed side-by-side between R2003 and R5000 versions. This is envisaged as a transitional activity, in order to assist with QC the migration to R5000; it will only work in project names are unchanged between R2003 and R5000.

Important note: this functionality is deprecated and will be removed in a future release.

To implement, add the environmental variable WOW2003_URL to `wow.env`, e.g.:

```
prompt> cd $OWHOME/WebApps/conf
prompt> vi wow.env
```
… add or modify the `WOW2003_URL` environmental variable):

```
# Fully qualified URL to WOW 2003 server
WOW2003_URL=http://wow2003; export WOW2003_URL
```

Adding Links to Project Summary Pages

External links may be added to any OpenWorks or SeisWorks project summary page, by modifying a simple configuration file. These links may be to external websites, documents published under WOW, or even other dynamic WOW pages (see KRS section below). See `$OWHOME/WebApps/conf/ wow_project_links.dat.default` for details.

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp wow_project_links.dat.default wow_project_links.dat
prompt> vi wow_project_links.dat
```

```
################################################################################
#
# The file is used in the WOW OpenWorks and SeisWorks project summary pages to
# provide a list of direct links to external data or documents, using a URL.
#
# Each line consists of 5 fields: Use double-quotes if there are spaces
#
#       - OpenWorks project name, e.g. SWDEVKIT
#       - SeisWorks survey name, e.g. devnor
#         ('n/a' for OpenWorks, '2D' if a 2D project)
#       - Data type, e.g. Z-MAPPlus
#       - Label, e.g. "Culture data for project"
#       - URL, e.g. http://wow/bin/zm_zgflist.cgi?zgf=/data/zmap/culture.zgf
#
################################################################################
SWDEVKIT   n/a     Miscellaneous "Farm-in Offer"
http://wow.lgc.com/wow/wow_relnotes.pdf
SWDEVKIT   n/a     Miscellaneous "Landmark Support"
http://www.halliburton.com/ps/default.aspx?navid=1062&pageid=2453
SWDEVKIT   n/a     VIP           "My favourite VDB file"
http://wow/bin/vip_case_list.cgi?vdb=/data1/VIP_data/111offshore.vdb
DEVNOR_IP  devnor  Z-MAPPlus     "Culture data for project"
http://wow/bin/zm_zgflist.cgi?zgf=/data3/zmap/29a2_amp.zgf
MINKIT_IP  2D      GeoProbe      "Viz data in GeoProbe"
http://wow/bin/gp_proj_summary.cgi?project=/data1/GeoProbe_data/Demo2/gerge
```

Accessing WOW pages from other applications

District Redirects

Most WOW pages can be accessed directly using an HTTP GET, i.e. a full URL with arguments. To see what this URL look like, place the cursor over any link in WOW, use the right mouse button and select option 'Open Link in New Window'. The URL will be displayed in the address bar of the new window.

In the examples below, http://wow.oilco.com is an illustrative main WOW URL, (environmental variable `WOW_URL` in `wow.env`), TESTDATA is an example OpenWorks project, and GOM an example district.

For example, to view a particular Well Summary page directly:
http://wow.oilco.com/bin/ow_well.cgi?owproj=TESTDATA&wellid=1&headeronly=true

If a site uses multiple districts, then this direct approach may fail, for example if the current district is set to one that does not contain the specified project. In these situations it is necessary to use the `wow_redirect.cgi` script to set the district before proceeding to the target page.

For example, to launch the SeisWorks module from outside WOW with a specified district:
http://wow.oilco.com/bin/wow_redirect.cgi?dist=GOM&url=http://wow.oilco.com/bin/sw.cgi

If the URL itself contains arguments, then it is necessary to replace '&' with '@' so that these arguments are then correctly passed on by the redirect script. For the well example above, the resulting redirect syntax is:
http://wow.oilco.com/bin/wow_redirect.cgi?dist=GOM&url=http://wow.oilco.com/bin/ow_well.cgi?owproj=TESTDATA@wellid=1@headeronly=true

Configuring KRS

OpenWorks knowledge reference system (KRS) documents can be loaded and viewed through WOW. The document types supported are 'Hardcopy', which is a reference to a physical location, and 'Web link', which is any URL beginning with `http://`.

Note that WOW itself can be used a source of both dynamic URLs to any related WOW page, or as a server to 'publish' a directory of static documents beneath WOW's Web root.

To display online files via WOW in this manner, create a link from the document parent directory to beneath the WOW Web root. For example if documents are in the`/data1/wowdocs` directory:

```
prompt> cd $OWHOME/WebApps/htdocs
prompt> ln –s /data1/wowdocs wowdocs
```

This provides location independence, i.e. the file `/data1/wowdocs/report123.html` is published as http://wow.oilco.com/wow/data1/wowdocs/report.html.

To obtain the hyperlink for any WOW page, e.g. the SEG-Y analyzer, hover over the link in WOW to see the syntax. These are usually self-explanatory, e.g. http://wow.oilco.com/bin/file_segy.cgi?file=/data1/other_data/segyfiles/fp32ibm.sgy.

Bulk Loading KRS Documents

A simple KRS document bulk loader is provided by the `loadKRSDocuments` utility, with Usage: `loadKRSDocuments owproj dsource dfile` e.g.:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> loadKRSDocuments TESTDATA BCR krs.dat
```

The format of the file to be loaded is fixed as follows: it must comprise whitespace-delimited ASCII text containing 7 attributes per line, constituting a single document to be loaded:

- Data type - must be one of `well`, `nav2d` or `nav3d`
- Data identifier - **UWI** for well, **line name** for `nav2d`, **survey name** for `nav3d`
- Document name - use quotes if name has spaces, e.g. "`Well 12 Scanned Logs`"
- Document category - must match an existing category, e.g. `WELL`, `SEISMIC`, `MAP`
- Document sub-category - may be new; use "" to indicate blank, e.g. `LOGS`
- URL or hardcopy location - URLs must begin with `http://`
- Comments (optional)

An example `krs_bulk_load_example.dat` is provided in `$WOW_HOME/conf`.

OpenWorks QC/QA Queries

The QC/QA module allows the storage and execution of SQL queries against OpenWorks projects. It differs from the stored queries in OpenWorks in that queries are 'global', i.e. they are stored once without needing to be copied between projects. Multiple queries can be run sequentially against a single project, or a single query can be run across multiple projects. The objective is to run a series of queries that provide a project health check, e.g. wells without KB, wells without TD etc.

Important note: The QC/QA logic as expressed in these queries may not apply to all sites, or made need modification based on local conditions. These queries are not meant to be universally applicable and infallible. Although a standard suite is provided, these may be copied to a site-specific version and edited. Editing the queries as provided is not recommended, as edits will be overwritten by subsequent WebApps updates.

Queries can be edited or added to this list by copying a `.sql` file to the `$OWHOME/WebApps/conf/sqlscripts` directory. Files should follow a certain format to execute properly within the browser:

Important points to note:

- The first line must contain '`REM title:`' – this is displayed as the title in the browser.
- The second line must contain '`REM dtype:`' – this tells the browser what to create the hyperlink to. Currently `well`, `wellloc` (well location), `field`, `lease`, `nav` (line), `nav3d` (survey) `seismic` and `horizon` data types are supported. Set `dtype` to some other value (e.g. `none`) if not a simple well, well location, field, lease, navigation, seismic or horizon query.
- Multiple optional '`REM: description:`' lines will be displayed if present, allowing documentation of queries and any variables expected. These are also used in a dynamically generated query description page.
- The first attribute selected must be the primary key for that data type, i.e. `well_id`, `well_location_id`, `field_id`, `lease_id, seis_geom_set_id, seismic_data_set_id, horizon_attr_hdr_id`. This first attribute then appears as a hypertext link in the browser. To turn off this behavior, set `dtype` to some other value, e.g. `none`.
- The final line must contain a '`/`' and nothing else.
- Support for standard SQL*Plus variable substitution is provided (`&varname` syntax). Variables will be displayed in the order in which they appear in the SQL.
- Support for list creation is provided for those data types that support lists: `well`, `field`, `lease`, `nav`, `nav3d` and `horizon`.

The advantage of this format is that files can be created and tested in standard SQL*Plus – the '`REM`' lines are treated as remarks and ignored, and the final '`/`' is the standard SQL terminator. If a query parses and executes in SQL*Plus, it will usually execute in the browser, with one exception: variable names including hyphen, period and open/close parentheses are illegal in SQL but will work here.

To turn on the display of the SQL in WOW, set the WOW_SHOW_SQL environmental variable to 1 (on) in $OWHOME/WebApps/conf/wow.env. The default is 0 (off):

```
# Show SQL in QC/QA module: 1=on 0=off
WOW_SHOW_SQL=1; export WOW_SHOW_SQL
```

An example QC/QA query is provided below:

```
REM title: Wells with 0 or null total depth
REM dtype: well
REM description: This query checks for wells with TD.
select
   well_id ID,
   well_uwi "UWI",
   well_name_free "Common Well Name",
   final_td "TD"
from
   well_master
where
   final_td is null
or
   final_td = 0
order by
   well_name_free
/
```

Important note: Optionally, individual lists of QC/QA queries will be picked up from a user's $HOME/sqlscripts directory, if present. This option will only work if level C security is configured. Users should prefix query names with their initials to ensure they are grouped together in the browser.

Command-Line Utilities

OpenWorks and SeisWorks project data management changes significantly in R5000. WOW provides a number of command-line utilities to assist users in understanding the new approach. These allow listing of districts, projects, surveys, lines, seismic, and horizons.

First source the WebApps environment before running any command-line utilities:
`prompt> source $OWHOME/WebApps/templates/wow.login` (if C-shell)
`prompt> . $OWHOME/WebApps/templates/wow.profile` (if Bourne shell)

Running the Utilities

Utility `dlist`: list districts, e.g.:

```
prompt> dlist
Deepwater District1 OWDefault Regional

prompt> dlist long
District         OWSYSSID         DPath
--------         --------         -----
District1        LINKSID          /home/bruce/conf_d1
Regional         OWLINUX5         /home/bruce/conf_dr
Deepwater        OWLINUX5         /home/bruce/conf_dx
OWDefault        OWLINUX5         /apps/ow/conf
```

Utility `checkDistrict`: check and report current district and instance, e.g.:

```
prompt> checkDistrict
District set to: Regional
Instance set to: OWLINUX5
```

Utility `owlist`: list OpenWorks project, e.g.:

```
prompt> owlist
Project              District             Type PDB
-------------------- -------------------- ---- ---
ARCHIVES             OWDefault            PDB
FLOUNDER             OWDefault            PDB
GOM                  Regional             PDB
OCEVET               Regional             PDB
SALT                 Regional             PDB
SWDEVKIT             OWDefault            PDB
TESTDATA             OWDefault            PDB
devnor2_ip           OWDefault            IP    SWDEVKIT
devnor_ip            OWDefault            IP    SWDEVKIT
empty2d_ip           OWDefault            IP    SWDEVKIT
hew3d01_ip           OWDefault            IP    SWDEVKIT
long2d_ip            OWDefault            IP    SWDEVKIT
minkit_ip            OWDefault            IP    SWDEVKIT
ocevet_ip            Regional             IP    OCEVET
pwt_ip               OWDefault            IP    SWDEVKIT
salt3d_ip            Regional             IP    SALT
```

Utility `prjlist`: list 'projects' names only, i.e. 3D surveys and OpenWorks projects containing 2D lines, with external storage defined. The convention is to list 3D surveys as <owproj>/<survey>, with project databases capitalized and interpretation projects in lowercase, e.g.:

```
prompt> prjlist
SWDEVKIT
SWDEVKIT/devnor
SWDEVKIT/devnor2
SWDEVKIT/hew3d01
SWDEVKIT/pwt
devnor2_ip/devnor2
devnor_ip/devnor
goliath2d
minkit2d
minkit_ip
pwt_ip/pwt
```

Utility `plist`: list 'projects', i.e. 3D surveys and OpenWorks projects containing 2D lines, plus counts of the main data types and other useful attributes, e.g.:

```
prompt> plist
 ID Survey     OW Project  Type  Lines  Seis   Hrz Last Interp Flts  Segs Datum Storage
 -- ------     ----------  ----  -----  -----  --- ----------- ----  ---- ----- -------
  6 devnor     SWDEVKIT       3D     0    24   367 2007-07-31     3    33     0 devnor
  6 devnor     devnor_ip      3D     0    24   367 2007-07-31     3    33     0 devnor
 10 devnor2    SWDEVKIT       3D     0     5     9 2007-07-14     3     3     0 devnor2
 10 devnor2    devnor2_ip     3D     0     5     9 2007-07-14     3     3     0 devnor2
  0 goliath2d  goliath2d      2D   169   224     2 2007-07-09     0     0     0 lgcmast
181 hew3d01    SWDEVKIT       3D     0     1     1 2007-07-09     0     0     3 hew3d01
  0 minkit2d   minkit2d       2D     4     8    18 2007-07-09     1     8     0 lgcmast devms
  0 minkit_ip  minkit_ip      2D     4     8    18 2007-07-09     1     8  1200 lgcmast devms
182 pwt        SWDEVKIT       3D     0     5     5 2007-07-09     0     0     0 pwt
182 pwt        pwt_ip         3D     0     5     5 2007-07-09     0     0     0 pwt
  0 SWDEVKIT   SWDEVKIT       2D   181   280    53 2007-08-05     1     8     0 lgcmast devms
```

The plist utility contains optional command-line arguments of survey type and project type, i.e. `plist <2D|3D|both> <pdb|ip|all>`

Utility `surveylist`: lists 3D surveys for the specified OpenWorks project, with the option to only display those with external storage (i.e. used by SeisWorks):

```
prompt> surveylist SWDEVKIT
   ID Survey               Storage Directory
----- -------------------- --------------------
    6 devnor               devnor
   10 devnor2              devnor2
  183 flndr3d
  181 hew3d01              hew3d01
  185 hew3d02              hew3d01
  186 hew3d03              hew3d01
  182 pwt                  pwt
```

Utility `linelist`: lists 2D lines for the specified OpenWorks project or external storage directory, e.g.:

```
prompt> linelist minkit2d 2D
   ID Linename                       Start   End Traces
----- ------------------------------ ----- ----- -----
    2 BSA-105                            1   900   900
    3 BSA-115                            1   900   900
    4 BSA-154                            1   720   720
    5 BSA-164                            1   955   955

prompt> linelist lgc_master Master
Linename
--------
BSA-105_____________________
FLNDR-1_____________________
FLNDR-2_____________________
FLNDR-3_____________________
FLNDR-4_____________________
FLNDR-5_____________________
FLNDR-6_____________________
```

Utility `seislist`: lists seismic files: `seislist owproj ?gtype? ?survey? ?fmt?` e.g.:

```
prompt> seislist SWDEVKIT 3D devnor bri
  ID  Survey or Line/Seismic File
----- --------------------------
11    devnor/AAA.bri
12    devnor/brick_32_float.bri
13    devnor/brick_float16_x8x8x16.bri
14    devnor/dev08_float8_10_10_20.bri
15    devnor/dev08_float8_inline.bri
16    devnor/dev08_float8_xline.bri
17    devnor/dev08_inline_float8.bri
```

`prompt> seislist SWDEVKIT 3D devnor` (lists all 3D seismic for specified survey)
`prompt> seislist SWDEVKIT 3D` (lists all 3D seismic for all surveys in the OW project)
`prompt> seislist SWDEVKIT` (lists 2D/3D seismic for all surveys/lines in the OW project)

Utility `hrzlist`: lists horizon headers: `hrzlist owproj ?gtype? ?survey?` e.g.:

```
prompt> hrzlist SWDEVKIT 3D devnor2
  ID  Name|Source|Attr|Version
----- ------------------------
406   Coverage_Pieces01.3dv|LGC|DEPTH STRUCTURE|
348   Coverage_Pieces01.3dv|LGC|TIME_STRUCTURE|
327   Coverage_dev0801.3dv|LGC|TIME_STRUCTURE|
346   top_13_add_renamed_x2|LGC|DEPTH_STRUCTURE|
342   top_reservoir_plus_100|LGC|DEPTH_STRUCTURE|
343   top_reservoir_plus_400|LGC|DEPTH_STRUCTURE|
344   top_reservoir_plus_700|LGC|AMPLITUDE|
345   top_reservoir_plus_900|LGC|AMPLITUDE|
```

Important note: handing spaces in arguments: If arguments have spaces, for example survey name, it is necessary to both quote and use braces, e.g.
`prompt> seislist SWDEVKIT 3D "{devnor survey 2}"`

Utility `ow_prj_sql`: runs SQL*Plus for the specified OpenWorks project. This is similar to the OpenWorks `ow_prj_access` script, except that the project password is not printed to the screen, but is used to connect directly to Oracle. As with `ow_prj_access`, the user running the utility must have the `OW_ADMINISTRATOR` role.

```
prompt> ow_prj_sql testdata

SQL*Plus: Release 10.2.0.3.0 - Production on Thu Aug 9 18:47:27 2007
Copyright (c) 1982, 2006, Oracle.  All Rights Reserved.
Connected to: …

SQL> select count(*) from well_master;
  COUNT(*)
----------
        37
SQL> exit
```

Utility `ow_user_sql`: runs SQL*Plus for the specified OpenWorks project. This is similar to the above `ow_prj_sql` script, except that the Oracle connection is made as the user, with the appropriate project access role granted and schema set. Unlike `ow_prj_sql`, the user running the utility does not need to have the `OW_ADMINISTRATOR` role.

```
prompt> ow_user_sql TESTDATA

SQL*Plus: Release 10.2.0.3.0 - Production on Mon Jun 21 14:56:10 2010
Copyright (c) 1982, 2006, Oracle.  All Rights Reserved.
Connected to: …

Connected
--------------------------------------------------------------------------------
Connected to TESTDATA as BRUCE with role MANAGE_TESTDATA on 21-JUN-10
```

Utility `pickReport`: lists picks to screen or file, including the following attributes: UWI, Well Name, Pick Name, Interpreter, X, Y, MD, TVD, TVDSS, TWT, and TD_NAME.

Utility `checkshotReport`: lists picks to screen or file, including the following attributes: UWI, Well Name, Time Depth Name, Interpreter, X, Y, TVD below TD Datum, MD below Well Elev, TVDSS below Well Elev, TWT, Int Velocity, Avg Velocity.

An alternative way to execute these reports is to use the `PickReport` and `CheckshotReport` graphical user interfaces.

Utilities `zgfpiclist`, **`zgfpicinfo`**, **`zgf2shp`**, **`zgfImage`**: see Converting ZGF Pictures to Shapefiles in Batch.

Utility `lasexport`: utility to export LAS files for a single well.
Usage: `lasexport owproj uwi ?dir? ?curveList? ?top? ?base?` e.g.:

```
prompt> lasexport GOM365 04019011430000
```
- exports all curves for the specified well to the default `$WOW_DATA_DIR/wow_images`

```
prompt> lasexport GOM365 04019011430000 /tmp
```
- exports all curves for the specified well to `/tmp`

```
prompt> lasexport GOM365 04019011430000 /tmp 345,346,388,401
```
- exports only the specified log curve IDs for the specified well to `/tmp`

Utility `findWells`: utility to find a number of wells by UWI or common well name across multiple OpenWorks projects. The utility outputs a tab-separated list of project, well_id, UWI, common well name and WOW url.
Usage: `findWells wellfile` e.g.:

```
prompt> findWells welllist.inp > welllist.out
```

Utility `wow_err`: command-line version of the WOW browser 'Errors' link; reports diagnostic information for the command-line and GUI utilities.

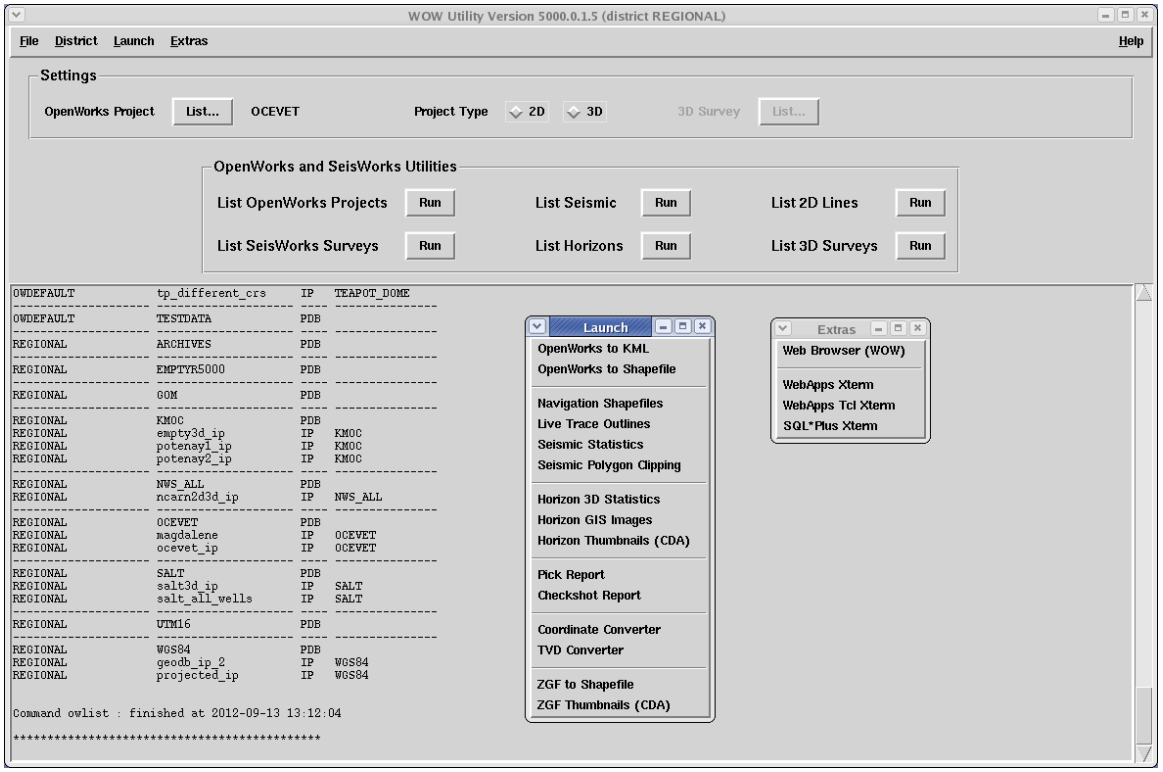
```
prompt> wow_err
Setting up WebApps environment...
Date:           2010-06-21 15:23
Version:        WebApps 5000.0.0.9 (2010-06-24)
OpenWorks:      5000.0.2.2
District:       Regional
SID:            OWLINUX5
OS:             Linux linux5 2.6.9-34.ELsmp #1 SMP Fri Feb 24 16:56:28 EST 2006
x86_64 x86_64 x86_64 GNU/Linux
Release:        Red Hat Enterprise Linux AS release 4 (Nahant Update 3)
User:           uid=500(bruce) gid=100(users) groups=100(users)
Oracle access      : OK
WOW license        : OK
OPENWORKS license  : OK
CDARCHIVER license : OK
PROJADMIN license  : OK

WOW Environment: /data/development/WebApps/conf/wow.env
…
```

The WOW GUI

The WOW GUI provides a single interface to launching most of the WOW graphical user interfaces and other command-line utilities. In an OpenWorks xterm, set the WebApps environment first, then run `wowgui`:

```
prompt> source $OWHOME/WebApps/templates/wow.login      (if C shell)
prompt> . $OWHOME/WebApps/templates/wow.profile         (if Bourne shell)
prompt> wowgui
```

The GUI is illustrated below:



Note also the **Launch** and **Extras** menus, allowing access to these additional WOW utilities:

- OpenWorks to KML conversion GUI (`0w2kml`)
- OpenWorks to shapefile conversion GUI (`0w2shp`)
- Navigation shapefiles creation GUI (`NavShape`)
- Live trace outlines creation GUI (`SeisLT0`)
- Seismic statistics calculation GUI (`SeisStats`)
- Seismic polygon clipping (`SeisPoly`)
- Horizon 3D statistics calculation GUI (`HrzStats3D`)
- Horizon GIS images conversion GUI (`HrzImage`)
- Horizon thumbnail creation GUI (`HrzThumbs`: requires CDA license)
- Pick report (`Pickreport`)

- Checkshot report (`CheckshotReport`)
- Generic coordinate converter (`CrsConvert`)
- Generic MD-TVD converter (`TvdConvert`)
- ZGF to shapefile conversion GUI (`Zgf2Shape`)
- ZGF picture thumbnail creation GUI (`ZgfThumbs`: requires CDA license)
- WOW browser, WebApps and Tcl xterms
- Commands `owlist` `plist` `seislist` `hrzlist` `linelist` `surveylist`.

Coordinate Conversion

WOW has historically had a single-point 'Lat/Lon ⇔ XY Calculator' which converts coordinates within the context of the OpenWorks project, i.e. between projected and geographic coordinates using the project's CRS. Version 5000.0.1.0 added the option to use WGS84 as the geographic coordinate system, allowing for datum shifting.

New in version 5000.0.1.2 are generic coordinate conversion utilities that will convert between any two cartographic reference systems (projected or geographic), provided the conversion is allowed by the underlying Blue Marble conversion software. Datum shifting is carried out automatically. The following have been added, illustrated further below:

- single-point conversion via WOW browser (on the OpenWorks project list page)
- `crsids` command line utility to list projected and basis CRSs
- `crsConvert` command line utility for single-point conversion
- `fileCrsConvert` command line utility for file-based conversions
- `CrsConvert` GUI for multiple point file-based conversions.

Utility `crsids`: lists project and basis CRS ID and name for all or a specified project. The CRS IDs are required for use in `crsConvert` and `fileCrsConvert`.

```
prompt> crsids

Project           Project CRS                        Basis CRS
-----------       -----------------------            -----------------------
CURVEMODE    667: utm-55 2                        41: Australian Geodetic 1966
FLOUNDER     670: utm-55 1                       669: Unknown - Australian 1965
GOM          709: UTM15_1                        252: North American Datum 1927
IRAQ_REG     727: UTM 38N Nahrwan 1967 - Iraq    726: Nahrwan 1967 - IRAQ - epsg1587
KMOC         679: kmoc_utm42_kras                678: Pulkovo 1942 - Hungary 1
OCEVET       707: UTM30N BG EuropeanDatum1950SP  103: European Datum 1950
RDTEST       720: UTM 31N 3E                     103: European Datum 1950
SALT         705: TXSC4204                       252: North American Datum 1927
SWDEVKIT     671: Project Default CRS 1          666: UNKNOWN
TEAPOT_DOME  713: Wyoming State Pl NAD 1927      252: North American Datum 1927
UTM16        676: UTM16/Clarke1866/NAD27/feet    675: North American Datum 1927
WGS84        370: World Geodetic System 1984       0:

prompt> crsids IRAQ_REG
Project:  IRAQ_REG
CRS ID:   727 (UTM 38N Nahrwan 1967 - Iraq)
Basis ID: 726 (Nahrwan 1967 - Iraq - epsg1587)
```

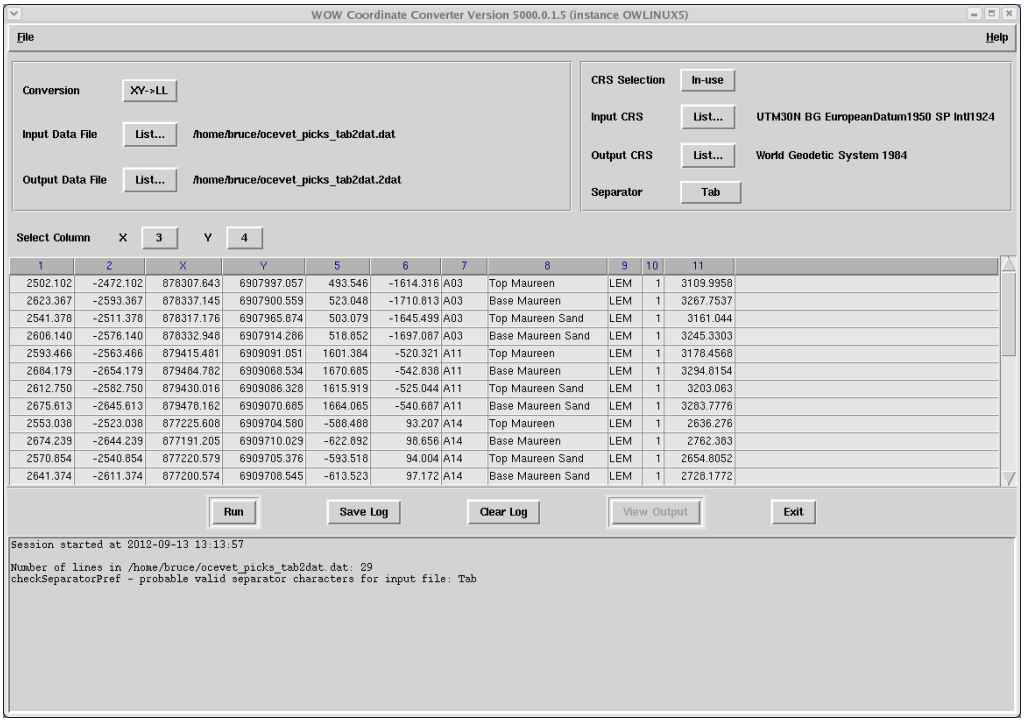
Utility `crsConvert`: command-line single-point conversion between any two cartographic reference systems (projected or geographic). Note the order of arguments: either X Y or Lon Lat (as opposed to Lat Lon).
Usage: `crsConvert xlon ylat src_crs_id target_crs_id`

```
prompt> crsConvert 43.4 36.9 726 727
357441.541 4084682.830
```

Utility `fileCrsConvert`: command-line file-based multiple-point conversion between any two cartographic reference systems (projected or geographic). The utility takes as input a columnar ASCII file, column IDs for the coordinates to convert, and source/target CRS IDs. Converted coordinates are inserted at the beginning of each line in the output file. Any header lines in the files will be ignored if prefixed with a # symbol. Usage:
`fileCrsConvert filein fileout xloncol ylatcol src_crs_id target_crs_id`

```
prompt> fileCrsConvert iraq1.dat iraq2.dat 3 2 726 727
```

Utility `CrsConvert`: GUI for file-based multiple-point conversion between any two cartographic reference systems (projected or geographic). The user choses a conversion direction (one of four options) and specifies the input and output data files; the input is displayed in table form in the GUI. Then choose the CRS selection mode, either list all CRSs or just those in use in the OW projects (a shorter list). After choosing an input and output CRS and X Y or Lat Lon columns, click 'Run' and then 'View Output':



1	2	X	Y	5	6	7	8	9	10	11
2502.102	-2472.102	878307.643	6907997.057	493.546	-1614.316	A03	Top Maureen	LEM	1	3109.9958
2623.367	-2593.367	878337.145	6907900.559	523.046	-1710.813	A03	Base Maureen	LEM	1	3267.7537
2541.378	-2511.378	878317.176	6907965.874	503.079	-1645.499	A03	Top Maureen Sand	LEM	1	3161.044
2606.140	-2576.140	878332.948	6907914.286	518.852	-1697.087	A03	Base Maureen Sand	LEM	1	3245.3303
2593.466	-2563.466	879415.481	6909091.051	1601.384	-520.321	A11	Top Maureen	LEM	1	3178.4568
2684.179	-2654.179	879484.782	6909068.534	1670.685	-542.838	A11	Base Maureen	LEM	1	3294.8154
2612.750	-2582.750	879430.016	6909086.328	1615.919	-525.044	A11	Top Maureen Sand	LEM	1	3203.063
2675.613	-2645.613	879478.162	6909070.685	1664.065	-540.687	A11	Base Maureen Sand	LEM	1	3283.7776
2553.038	-2523.038	877225.608	6909704.580	-588.488	93.207	A14	Top Maureen	LEM	1	2636.276
2674.239	-2644.239	877191.205	6909710.029	-622.892	98.656	A14	Base Maureen	LEM	1	2762.383
2570.854	-2540.854	877220.579	6909705.376	-593.518	94.004	A14	Top Maureen Sand	LEM	1	2654.8052
2641.374	-2611.374	877200.574	6909708.545	-613.523	97.172	A14	Base Maureen Sand	LEM	1	2728.1772

Utilities `fileXY2LL` and `fileLL2XY`: file-based bulk conversion of X/Y to Lat/Long coordinates (and vice versa) within the context of a specified OW project. *These are deprecated in favor of* `fileCrsConvert`. These utilities takes as input a columnar ASCII file, compute latitude and longitude for the specified column IDs containing the X and Y coordinates (or vice-versa), and inserts these at the beginning of each line in the file.

If the `crsflag` is specified as `project`, the CRS information is taken from the specified OpenWorks project; if `wgs84` conversion to WGS84 geographic datum is carried out.
Usage: `fileXY2LL owproj filein fileout Xcol Ycol ?crsflag?`
Usage: `fileLL2XY owproj filein fileout Latcol Loncol ?crsflag?`

MD/TVD Conversion

New in version 5000.0.1.6 is a generic conversion utility that will convert an ASCII file of well-related measured depth (MD) data to true vertical depth (TVD), also including subsea true vertical depth (TVDSS) and X/Y absolute and relative coordinates for each point. The reverse operation is also possible, i.e. from TVD to MD. The following have been added:

- `fileMDtoTVD` command line utility for file-based conversions
- `fileTVDtoMD` command line utility for file-based conversions
- `TvdConvert` GUI for file-based conversions.

Utilities `fileMDtoTVD` and `fileTVDtoMD`: file-based bulk conversion of MD to TVD (and vice versa) within the context of a specified OW project. These utilities takes as input an OpenWorks project name, a columnar ASCII file, and column number within the file for UWI and MD or TVD columns. The corresponding depth is computed and additional attributes are inserted at the beginning of each line of the specified output file. Any header lines in the files will be ignored if prefixed with a # symbol. Command-line usage:

```
prompt> fileMDtoTVD
Usage: fileMDtoTVD owproj filein fileout md_col uwi_col ?delim? ?units?

prompt> fileMDtoTVD
Usage: fileTVDtoMD owproj filein fileout tvd_col uwi_col ?delim? ?units?
```

`<owproj>` OpenWorks project name

`<filein>` input ASCII file name

`<fileout>` output ASCII file name

`<tvd_col/md_col>` column no. containing the depth measure to be converted

`<uwi_col>` column no. containing the well UWI

`<delim>` delimiter: Space, Tab or Comma

`<units>` depth units: 1 = meters, 2 = feet

Example:

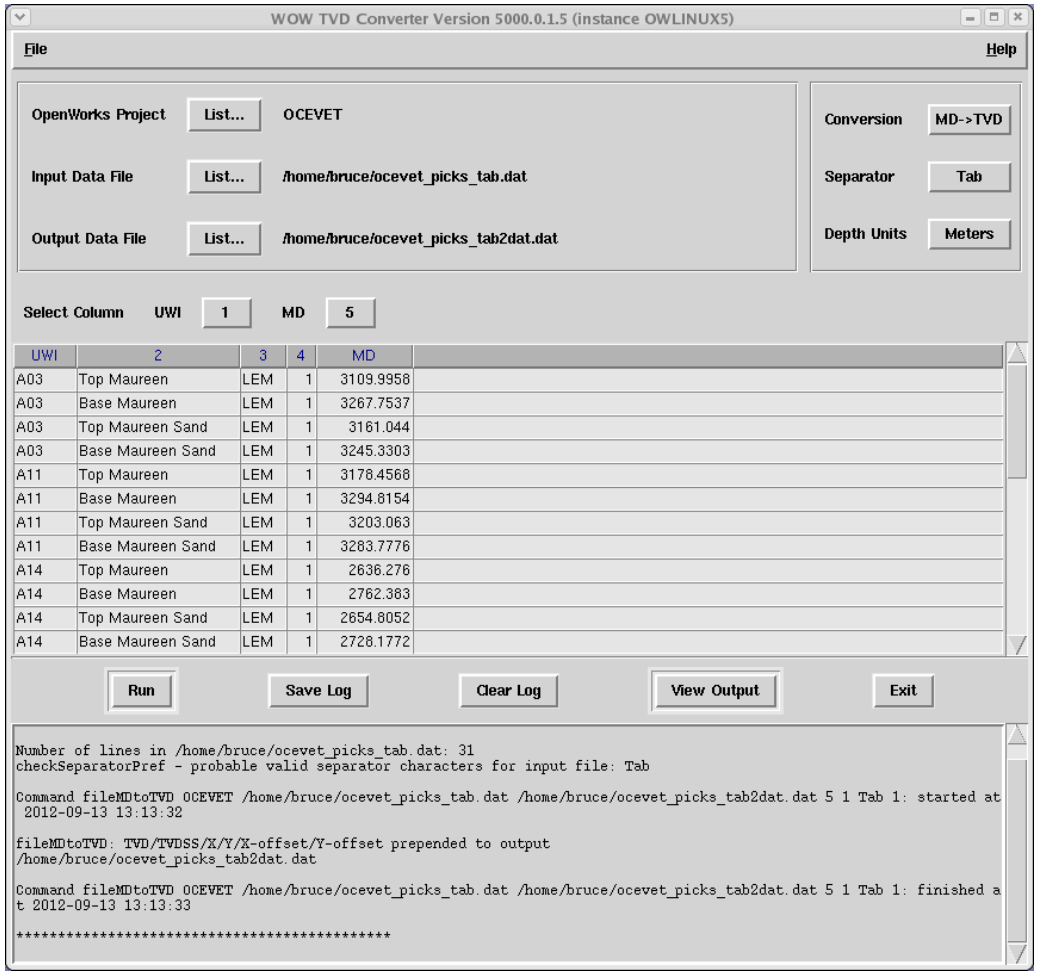
```
prompt> fileMDtoTVD picks.dat picks2.dat 5 1 Tab 1
```

Utility `TvdConvert`: GUI for file-based multiple-point MD/TVD conversion. The user choses an OpenWorks project, a conversion direction, and specifies the input and output data files. The input is displayed in table form in the GUI and the separator (space, tab or comma) is determined. Note that must be provided, there is no way to default this. After specifying depth units, click 'Run' and then 'View Output':

To run the `TvdConvert` graphical user interface, first source the WebApps environment then type the appropriate command:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> TvdConvert
```

The `TvdConvert` GUI is illustrated below.



`TvdConvert` may also be launched from the `wowgui` interface.

Integrating with Google Earth

This module provides the ability to create Google Earth format `.kmz` files from OpenWorks projects. These `.kmz` files are in fact zip files containing the `.kml` file with spatial information, and associated `.png` files for well, line and survey icons.

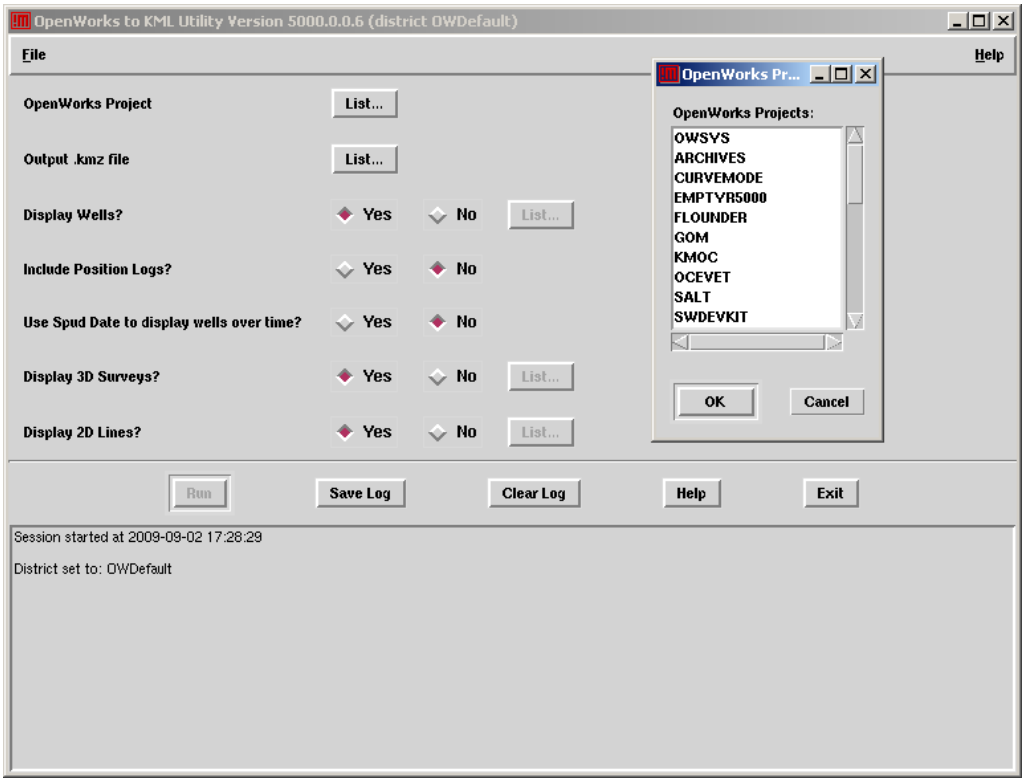
Coverage includes well locations, position logs, 2D lines, 3D surveys and OpenWorks project extents based on well data.

Important note: this module converts project X/Y coordinates into lat/long using the WGS84 geodetic datum, which may differ from the project geodetic datum.

To execute from a graphical user interface, first source the WebApps environment then type `Ow2kml`. `Ow2kml` may also be launched from the `wowgui` interface.

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> Ow2kml
```

The GUI is illustrated below. Select any project, or `OWSYS` to generate OpenWorks project extents. An output `.kmz` file must also be selected. By default, all wells, surveys and lines will be included; specify lists to subset if required. There are also options to include position logs (no by default) and to use spud date to display wells over time.



To execute on the command-line using `ow2kml`, first source the WebApps environment, then type `ow2kml` to see the usage:

```
prompt> ow2kml

Usage: ow2kml owproj ?fileout? ?wellListID? ?posLogFlag?
?timeSpanFlag? ?surveyListID? ?lineListID?
```

<owproj>	OpenWorks project name
<fileout>	Full path to output .kmz file
<wellListID>	well list ID: -1 = all wells (default), 0 = no wells
<posLogFlag>	1 = include position logs (default), 0 = exclude position logs
<timeSpanFlag>	1 = use spud date to display wells over time, 0 = don't use (default)
<surveyListID>	3D survey list ID: -1 = all surveys (default), 0 = no surveys
<lineListID>	2D line list ID: -1 = all lines (default), 0 = no lines

For example, to generate a default .kmz containing all data for project FLOUNDER:

```
prompt> ow2kml FLOUNDER /tmp/flounder.kmz
Processing FLOUNDER wells+poslogs, 3D surveys, 2D lines to
/tmp/flounder.kmz
- opening kml file
- writing styles
- processing 6 wells
- processing 2 surveys
- processing 25 lines
- closing kml file
- zipping up kmz
/tmp/flounder.kmz
```

Specify project OWSYS to generate OpenWorks project database and interpretation project extents, e.g.
`prompt> ow2kml OWSYS /tmp/projects.kmz`

Network links: OWSYS and project-level kmz files may also be served dynamically using a region-based network link. These are in fact produced on the Web server and streamed to the client, such as Google Earth. In the examples below, http://wow.oilco.com is an illustrative main WOW URL (environmental variable WOW_URL in wow.env), OWLINUX5 is an example OpenWorks instance, and TEAPOT_DOME an example district:

To see all project outlines, and zoom in to activate a project region:
http://wow.oilco.com/bin/ow2kml.cgi

If in a multi-Oracle-instance environment, instance must be specified:
http://wow.oilco.com/bin/ow2kml.cgi?sid=OWLINUX5

To create a network link for an individual project:
http://wow.oilco.com/bin/ow2kml.cgi?owproj=TEAPOT_DOME

Browser execution: from version 5000.0.0.11, kml files may also be generated and downloaded directly from WOW, on the OpenWorks Project List and Summary pages.

Creating OpenWorks WGS84 Shapefiles in Batch

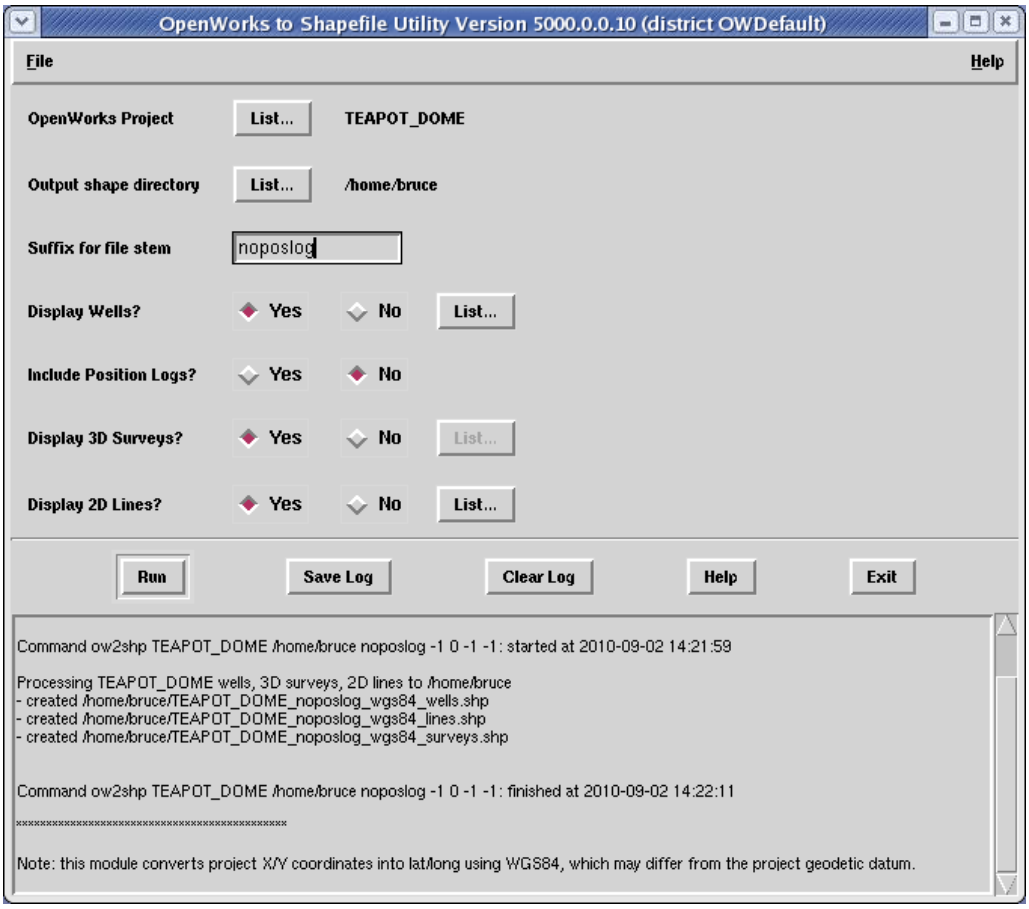
WOW interactively produces WGS84 geographic shapefiles of wells, position logs, 2D lines and 3D surveys from the OpenWorks Project Summary page. This process can optionally be run on the command-line of from a graphical user interface.

Important note: this module converts project X/Y coordinates into lat/long using the WGS84 geodetic datum, which may differ from the project geodetic datum.

To execute from a graphical user interface, first source the WebApps environment then type `Ow2shp`. `Ow2shp` may also be launched from the `wowgui` interface.

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> Ow2shp
```

The GUI is illustrated below. Select any project, an output directory and an optional suffix to help distinguish the output files. By default, all wells, surveys and lines will be included; specify lists to subset if required. There is also an option to include position logs (no by default).



To execute on the command-line using `ow2shp`, first source the WebApps environment, then type `ow2shp` to see the usage:

```
prompt> ow2shp

Usage: ow2shp owproj ?shpdir? ?suffix? ?wellListID? ?posLogFlag?
?lineListID? ?survListID? ?botHoleFlag?
```

<owproj>	OpenWorks project name
<shpdir>	Full path to output shapefile directory
<suffix>	Optional suffix to include in shapefile name
<wellListID>	well list ID: -1 = all wells (default), 0 = no wells
<posLogFlag>	1 = include position logs (default), 0 = exclude position logs
<lineListID>	2D line list ID: -1 = all lines (default), 0 = no lines
<surveyListID>	3D survey list ID: -1 = all surveys (default), 0 = no surveys
<botHoleFlag>	1 = use bottom hole location, 0 = use top hole location (default)

For example, to generate shapefiles containing all data for project FLOUNDER in /tmp with suffix Sep10:

```
prompt> ow2shp FLOUNDER /tmp Sep10
Processing TEAPOT_DOME wells+poslogs, 3D surveys, 2D lines to
/tmp
- created /tmp/TEAPOT_DOME_Sep10_wgs84_wells.shp
- created /tmp/TEAPOT_DOME_Sep10_wgs84_poslogs.shp
- created /tmp/TEAPOT_DOME_Sep10_wgs84_lines.shp
- created /tmp/TEAPOT_DOME_Sep10_wgs84_surveys.shp
```

Interpretation Project outlines: from version 5000.0.1.4, shape files containing WGS84 interpretation project outlines may also be generated and downloaded directly from WOW, on the OpenWorks Project Summary page. For command-line generation, use ow2shp with project specified as OWSYS, e.g.

```
prompt> ow2shp OWSYS $HOME all_interp_projects
Processing interpretation project outlines to /home/bruce
- created /home/bruce/all_interp_projects.shp
```

Creating Projected Navigation Shapefiles in Batch

WOW interactively produces XY projected shapefiles of 2D and 3D navigation, one project/survey at a time. This process can optionally be run in batch to produce shapefiles for all projects.

The script navShapeAll will process navigation shapefiles in batch for multiple projects. navShapeAll has the following arguments:

-p <projtype:2d|3d|all>	process all, all 2D or all 3D projects
-o <override directory>	optional directory to write to
-s <shapetype:poly|grid>	'poly' for polygon, 'grid' for points (3D only)
-l <lineinc>	line increment for points (3D only)
-t <traceinc>	trace increment for points.

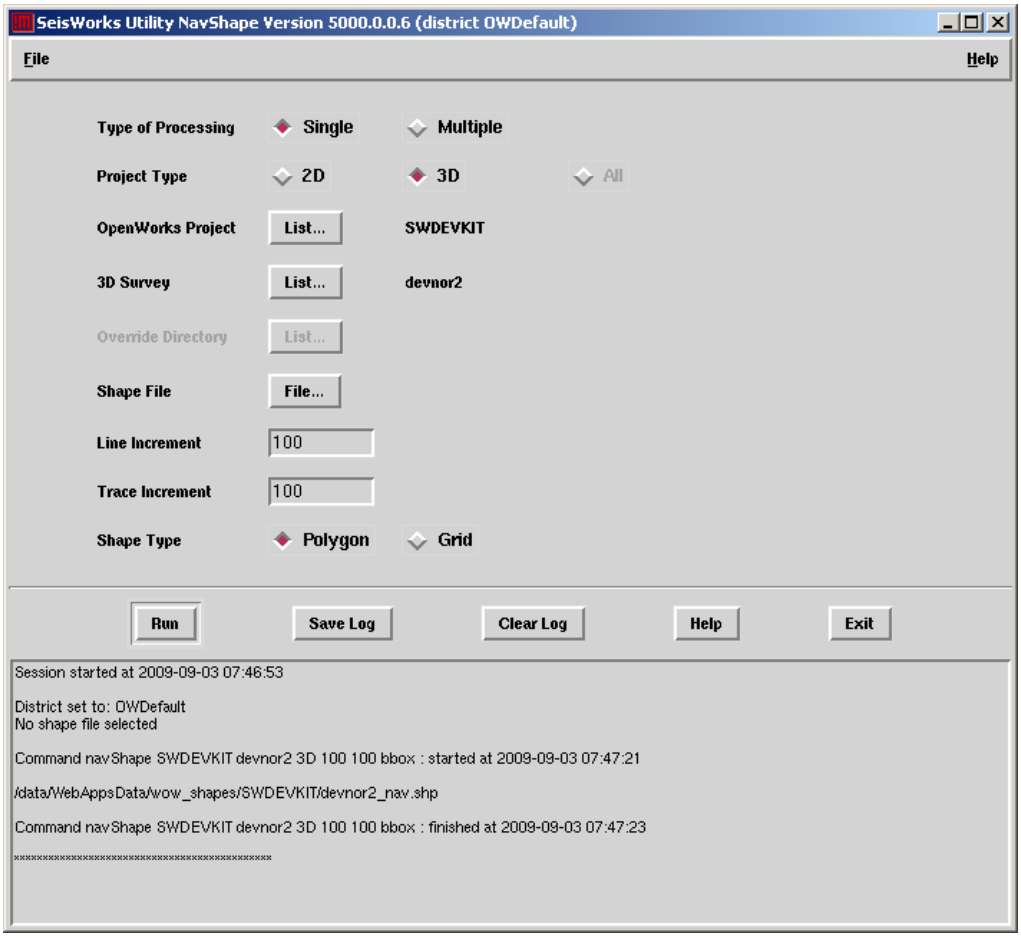
The directory override allows all shapefiles to be written to a single location, rather than the default `$WOW_DATA_DIR/wow_shapes/<owproj>` directory.

To create navigation shapefiles for a single project/survey, use `navShape` with usage:
`navShape owproj survey gtype ?lineinc? ?traceinc? ?shapetype? ?shp?`
`e.g. navShape SWDEVKIT devnor 3D`

Use survey `All3D` to process all surveys in the project.

An alternative way to create navigation shapefiles is to use the `NavShape` graphical user interface, illustrated below. First source the WebApps environment then type `NavShape`:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> NavShape
```



`NavShape` may also be launched from the `wowgui` interface.

Important note: `navShapeAll` will skip surveys listed in a file named `plist.bad` in the directory of execution. This allows the user to rapidly skip any suspect data causing the process to fail, without needing to attempt to fix the issue.

Creating Horizon Images in Batch

WOW interactively produces images of horizons, one at a time, for use as backdrops in GIS applications. This process can optionally be run in batch to produce images for all horizons in a specified project.

The script `hrzImageBatch` has the following usage:

```
hrzImageBatch owproj survey gtype ?xsize? ?clm? ?dir?
```

`<owproj>`	OpenWorks project name
`<survey>`	SeisWorks survey name – use `All3D` for all 3D surveys in the OpenWorks project, `dummy` or repeat OpenWorks project name for all 2D lines
`<gtype>`	SeisWorks survey type (2D/3D)
`<xsize>`	approximate image width in pixels, default 600
`<clm>`	optional SeisWorks color map (clm) file name, default is spectrum
`<dir>`	optional directory to write to, default `$WOW_DATA_DIR/wow_images/<owproj>`

The example below will create the `.jpg` and `.jpgw` images for horizons in 3D survey `colt` in the `/tmp` directory. The images will be created using the `rspectrum` colormap and will have a width of 1000 pixels:

```
prompt> hrzImageBatch SWDEVKIT colt 3D 1000 rspectrum.clm /tmp
```

Important note: handing spaces in arguments: If the survey name has spaces it is necessary to quote and use braces, e.g.

```
prompt> hrzImageBatch SWDEVKIT "{colt survey}" 3D
```

The example below will create the `.jpg` and `.jpgw` images for horizons for all 2D lines in the OpenWorks project `minkit_ip` in the default directory. The images will be created using the default spectrum colormap and will have the default width of 600 pixels:

```
prompt> hrzImageBatch minkit_ip minkit_ip 2D
```

An alternative way to execute the horizon image creation is to use the `HrzImage` graphical user interface. First source the WebApps environment then run `HrzImage`.

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> HrzImage
```

`HrzImage` may also be launched from the `wowgui` interface.

Creating 'Live Trace' Outlines

The Default 'Live Trace' Algorithm

The default algorithm is designed to display the actual extent of 2D or 3D seismic traces, rather than the navigation extents. In the 2D case, the output shows exactly which lines or parts thereof have the specified processed level.

In the 3D case, the output attempts to show the exact shape or outline where traces exist within the rectangular project limits. The 3D algorithm operates by walking clockwise around the outside of the survey, until it returns to the starting point. The algorithm does not read every trace, which makes it considerably faster, but it consequently cannot handle the following scenarios:

- Surveys where e.g. every 2nd line or trace is loaded
- Internal holes within the survey
- Non-contiguous pieces of seismic data
- Zero-valued traces, i.e. real traces with zeros, as distinct from absent or null traces

The default algorithm therefore produces reasonable outlines in the majority of 3D cases, but will not always succeed. An alternative algorithm is provided to address this and is described further overleaf.

Using the Default Algorithm in Batch

WOW aims to dynamically create Web pages or images on the fly, i.e. without resorting to static, pre-created files. Seismic trace outlines present a real challenge in this regard. 3D volumes containing many millions or traces may not complete within the patience threshold of a typical user.

A batch mechanism is therefore provided to auto-generate the live trace outlines as png images, or if 3D, as shapefiles, ASCII coordinate files or ZGF pictures.

Options are provided to generate outlines in these formats for a single volume, all volumes within a project or for all projects.

To generate a single outline for 2D or 3D, use utility `seisLTO`, with usage:

```
seisLTO owproj survey gtype seismic ?stride? ?delta?
   ?lineinc? ?traceinc? ?xsize? ?padding?
   ?outfile? ?zgfout? ?picout? ?shapetype?
```

`<owproj>` OpenWorks project name

`<survey>` SeisWorks survey name

`<gtype>` 2D/3D

`<seismic>` seismic file name or proclev, e.g. mig0801.3dv or mig080001

`<stride>` look-ahead factor (default 25 traces – 3D only)

`<delta>` thinning distance (default 10 traces – 3D only)

`<lineinc>` line increment for symbol posting (default 100 – 3D only)

<traceinc> trace increment for symbol posting (default 100)

<xsize> approximate image size, in pixels (default 500)

<padding> padding around image, in pixels (default 40)

<outfile> output image file name (default stdout)

<zgfout> optional output zgf file (default none)

<picout> optional output ZGF picture name (default none)

Note that the output file extension determines the output type. Note also the different syntax for ZGF file output. See the next section for a simpler mechanism for generating outlines over all volumes in a project.

Alternative Algorithm

An alternative 3D-only algorithm that does read every trace is also provided. Although it is considerably slower, the standard invocation can handle internal holes within the survey, non-contiguous pieces of seismic data, and decimated surveys. To test this algorithm, use utility `seisLTOexact`, with similar arguments as `seisLTO`.

```
seisLTOexact owproj survey gtype seismic ?stride? ?delta?
   ?lineinc? ?traceinc? ?xsize? ?padding?
   ?outfile? ?zgfout? ?picout? ?zeroFlag?
```

The additional `zeroFlag` option will test for zero-valued traces.

Generating Outlines for all Volumes in a Project

To `generate` outlines for all volumes for a project with the default algorithm, use `seisLTO2D or seisLTO3D`. This includes a `clobber` argument (3D only), allowing you to regenerate all images (`clobber`) or only regenerate if the seismic has been modified since the last live trace outline was created (`noclobber`).

Important note: `noclobber` does not work reliably with shapefile output where multiple outlines are stored within a single file; using `clobber` with shapefile and zgf output is therefore advised.

`seisLTO2D owproj ?traceinc? ?size? ?dir?`

<owproj> OpenWorks project name

<traceinc> trace increment for symbol posting (default 100)

<dir> override directory location

<xsize> approximate image size, in pixels (default 500).

`seisLTO3D owproj survey fmt ?clob? ?stride? ?delta? ?linc? ?tinc? ?size? ?speed? ?dir?`:

<owproj> OpenWorks project name

<survey> SeisWorks survey name – use `All3D` for all surveys in the project

<fmt> `png`, `asc`, `zgf` or `shp`

<clob>	default is noclobber, i.e. only regenerate if the seismic has changed
<stride>	look-ahead factor for 3D (default 25 traces)
<delta>	thinning distance for 3D (default 10 traces)
<linc>	line increment for symbol posting (default 100 – ignored for 2D)
<tinc>	trace increment for symbol posting (default 100)
<size>	approximate image size, in pixels (default 500)
<speed>	fast (uses seisLTO) or slow (uses seisLTOexact)
<dir>	optional single directory to write to; overrides default system directory.

Note that an output file name need not be specified as the png, ASCII or ZGF files are located with the following naming convention:

PNG image:
$WOW_DATA_DIR/wow_images/<owproj>/<swproj>/<survey>_<seismic>.png

ASCII file:
$WOW_DATA_DIR/wow_images/<owproj>/<swproj>/<survey>_<seismic>.asc

Shapefile:
$WOW_DATA_DIR/wow_shapes/<owproj>/<swproj>/<survey>_lto.shp
(Each seismic volume produces a single shape within the shapefile.)

ZGF file:
$WOW_DATA_DIR/wow_shapes/<owproj>/<swproj>/<survey>_lto.zgf
(Each seismic volume produces a single picture within the ZGF file.)

Examples:

```
prompt> seisLTO3D SWDEVKIT devnor png (generates default png pictures)
prompt> seisLTO3D SWDEVKIT "{devnor survey}" png (survey has spaces)
prompt> seisLTO3D SWDEVKIT devnor png clobber 25 10 50 50 800
```
(overwrite the defaults with new parameters).

Generating Outlines for all Projects

Finally, to generate outlines for *all* 2D or 3D projects with the default algorithm, the scripts $OWHOME/WebApps/bin/seisLTO2DAll and seisLTO3DAll will run on the command line with options as shown below. For 3D, specify the –c flag for clobber behavior; do not specify it for noclobber behavior.

```
prompt> seisLTO2DAll -t <traceinc> -x <xsize> -o <override dir>

prompt> seisLTO3DAll –c –f <format: png|asc|zgf|shp>
   –s <stride> -d <delta> -l <lineinc> - t <traceinc> -x <xsize>
   -a <algorithm:slow|fast> -o <override directory>
```

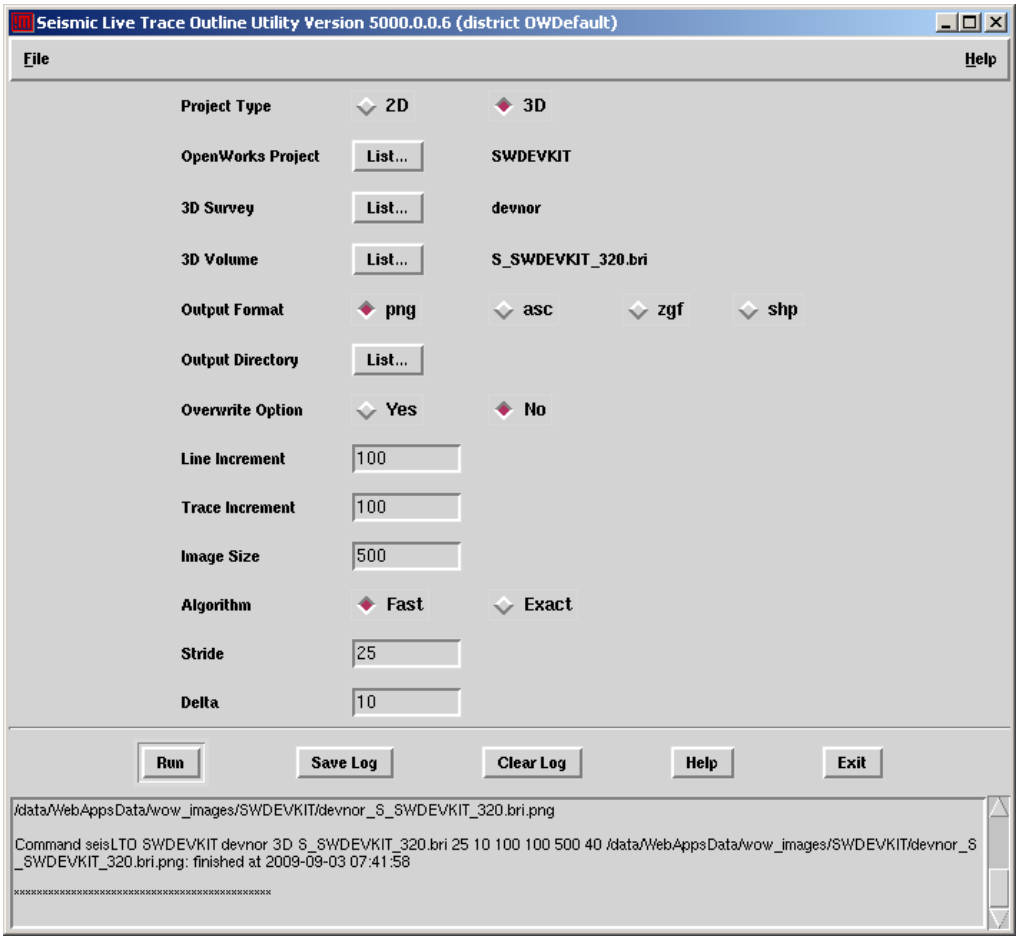
The directory override allows all shapefiles to be written to a single location, rather than the default project system directory.

Important note: specifying `-a slow` to invoke the `seisLTOexact` algorithm will take considerably longer and is not recommended. Rather, use the default fast algorithm, then selectively use the slow algorithm where the default does not give a satisfactory output.

Using the SeisLTO GUI

An alternative way to execute the live trace outline utilities is to use the `SeisLTO` graphical user interface, illustrated below. First source the WebApps environment then type `SeisLTO`:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> SeisLTO
```



Parameters are as described in the previous pages.

`SeisLTO` may also be launched from the `wowgui` interface.

Note: To convert the ASCII live trace outlines from XY to Lat/Long coordinates, the `fileXY2LL` utility may be used as documented in the Command-Line Utilities section of this document.

Updating Seismic and Horizon Statistics

The seismic data set table in OpenWorks includes attributes for trace count, coverage %, number of extents and total volume size. These are currently not maintained by SeisWorks, but provide useful metadata to the user and data manager if loaded correctly.

For 3dv and 3dh volumes, trace count is stored and can be read directly. For bri and cmp volumes, reading traces is required to obtain a valid trace count. The algorithm allows for decimation to improve performance at the expense of accuracy. For example, if a decimation of 3 is specified, every third line and trace is read, i.e. one trace in 9. The resulting count is then multiplied by 9. The computed trace count is not exact, but the process runs 9 times faster.

Command-line usage:

```
prompt> seisStats
Usage: seisStats owproj survey ?decimation? ?forceFlag?
```

3D example: OW project SWDEVKIT survey devnor, default decimation of 1 (i.e. no decimation on read), force re-computation (forceFlag=1):

```
prompt> seisStats SWDEVKIT devnor 1 1
```

If survey name has spaces, the following syntax is required:

```
prompt> seisStats SWDEVKIT "{devnor}"
```

Use All3D for all surveys in the project.

2D example:

```
prompt> seisStats SWDEVKIT 2D
```

The computed attributes can be seen in the SeisWorks seismic view, Seismic Info dialog. Results for multiple volumes can also be viewed in Seismic Data Manager: use the column chooser to select these attributes, which are not displayed by default.

The horizon data table in OpenWorks includes attributes for total samples, coverage % and mean, which are not maintained by SeisWorks, but provide useful metadata to the user and data manager if loaded correctly.

Command-line usage (3D horizons only): use forceFlag=1 to force re-computation:

```
prompt> hrzStats3D
Usage: hrzStats3D owproj survey ?forceFlag?

prompt> hrzStats3D SWDEVKIT devnor2
```

An alternative way to execute seisStats and hrzStats3D is to use the SeisStats or HrzStats3D graphical user interfaces. First source the WebApps environment then type the appropriate command. SeisStats/HrzStats3D may also be launched from the wowgui interface.

```
prompt> source $OWHOME/WebApps/templates/wow.login    (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile       (if Bourne shell)
prompt> SeisStats
prompt> HrzStats3D
```

Seismic Polygon Clipping

The seismic polygon clipping a utility takes as input a 3D seismic volume, trims it to one or more polygon shapes within the specified mapping polygon set in OpenWorks, and writes a new seismic volume as output. This may be used for example to cut out some complex lease shape from a larger survey.

Additional notes:

- Polygons may be INCLUSIVE or EXCLUSIVE, i.e. the output will include all traces within one or more INCLUSIVE polygons, and exclude traces that are in any EXCLUSIVE polygons.
- If there are only EXCLUSIVE polygons and no INCLUSIVE polygons, then assume an INCLUSIVE polygon bounding the 3D survey outline.
- No seismic reformatting is done, so same output format as the input, just clipped to the polygon boundaries.
- The output seismic dataset and version must not exist.
- The polygon set id must exist and must contain polygons.

Command-line usage:

```
prompt> seisPoly
Usage: seisPoly owproj survey seismic dataset version id
```

<owproj> OpenWorks project name

<survey> SeisWorks survey name

<seismic> input seismic file name, e.g. mig0801.3dv

<dataset> output seismic dataset name

<version> output seismic version

<id> mapping polygon set id.

Example:

```
prompt> seisPoly SWDEVKIT devnor mig0801.3dv clipped V1 123
```

If survey name, output dataset or version has spaces, the following syntax is required:

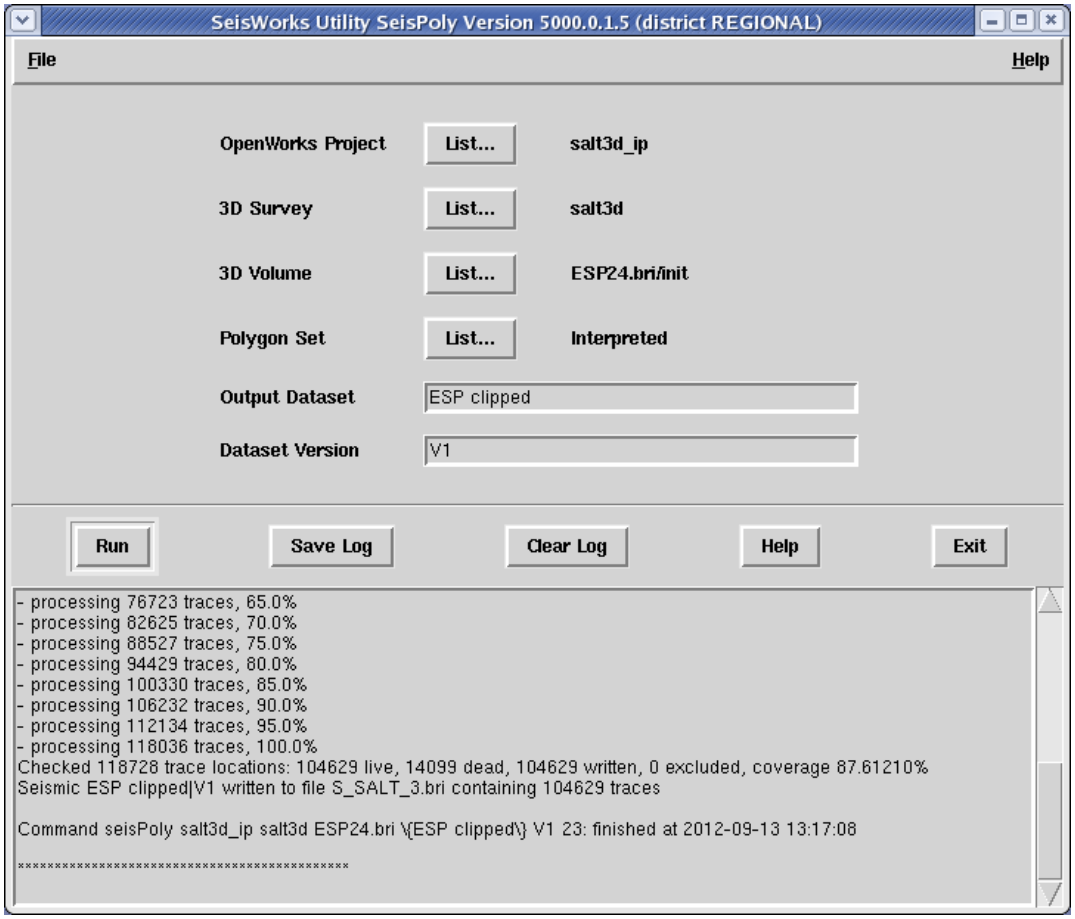
```
prompt> seisPoly SWDEVKIT devnor ESP24.bri "{ESP clipped}" V1 123
```

An alternative way to execute `seisPoly` is to use the `SeisPoly` graphical user interface. First source the WebApps environment then type the appropriate command:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> SeisPoly
```

`SeisPoly` may also be launched from the `wowgui` interface.

The `SeisPoly` GUI is illustrated overleaf.


SeisWorks Utility SeisPoly Version 5000.0.1.5 (district REGIONAL)
File
Help
OpenWorks Project
List...
salt3d_ip
3D Survey
List...
salt3d
3D Volume
List...
ESP24.bri/init
Polygon Set
List...
Interpreted
Output Dataset
ESP clipped
Dataset Version
V1
Run
Save Log
Clear Log
Help
Exit
- processing 76723 traces, 65.0%
- processing 82625 traces, 70.0%
- processing 88527 traces, 75.0%
- processing 94429 traces, 80.0%
- processing 100330 traces, 85.0%
- processing 106232 traces, 90.0%
- processing 112134 traces, 95.0%
- processing 118036 traces, 100.0%
Checked 118728 trace locations: 104629 live, 14099 dead, 104629 written, 0 excluded, coverage 87.61210%
Seismic ESP clipped|V1 written to file S_SALT_3.bri containing 104629 traces
Command seisPoly salt3d_ip salt3d ESP24.bri \{ESP clipped\} V1 23: finished at 2012-09-13 13:17:08
****

Using ZGF Backdrops

The SeisWorks navigation, live trace outline and horizon map displays can be enhanced through the use of ZGF backdrops. This allows the maps to include wells, fields, leases, bathymetry, coastlines, shipping lanes etc. – whatever is in the specified ZGF picture.

ZGFs are ideal for cultural backdrops, in that they are the OpenWorks standard neutral backdrop culture format. They are widely used across applications and can be created in SeisWorks, StratWorks, Z-MAP Plus and WOW.

There is no accepted default location for these files, but they are often stored in the ZGF subdirectory of one of the OW_PROJ_DATA/<owproj> directories. WOW will therefore use the first wow_backdrop.zgf file it encounters when searching these directories in order. If found, the first picture from the file is used.

Note that this file may be a simple link, e.g.

```
prompt> cd <OW_PROJ_DATA>/<OpenWorks Project>/ZGF
prompt> ln –s <actual ZGF name> wow_backdrop.zgf
```

Note also that the batch generation of seismic live trace outlines, using script seisLTO3DAll as described in the previous section, uses the same logic.

Converting ZGF Pictures to Shapefiles/Images in Batch

Utility zgf2shp provides the same functionality as in the WOW browser for converting a ZGF picture file to a shapefile. Utility zgfImage provides the same functionality as in the WOW browser for converting a ZGF picture file to a geo-referenced image, i.e. a .jpg file plus .jpgw world file.

Additional utilities zgfpiclist and zgfpicinfo are provided to obtain the arguments required for zgf2shp. The workflow is illustrated below:

```
prompt> zgfpiclist
Usage: zgfpiclist zgf

prompt>  zgfpiclist contract_28.ZGF
3d outlines
overlay_for_finder

prompt> zgfpicinfo
Usage: zgfpicinfo zgf picture

prompt> zgfpicinfo contract_28.ZGF "{3d outlines}"
{1 Borders} {6 Text} {16 Fault trace} {30 Colorfilled polygons}
{36 Lease borders and labels}

prompt> zgf2shp
Usage: zgf2shp zgf picture stem lgbs ?dir?

prompt> zgf2shp contract_28.ZGF "{3d outlines}" outline3d 16,36 /tmp
/tmp/outline3d_faults_arc.shp /tmp/outline3d_lgb36_arc.shp
```

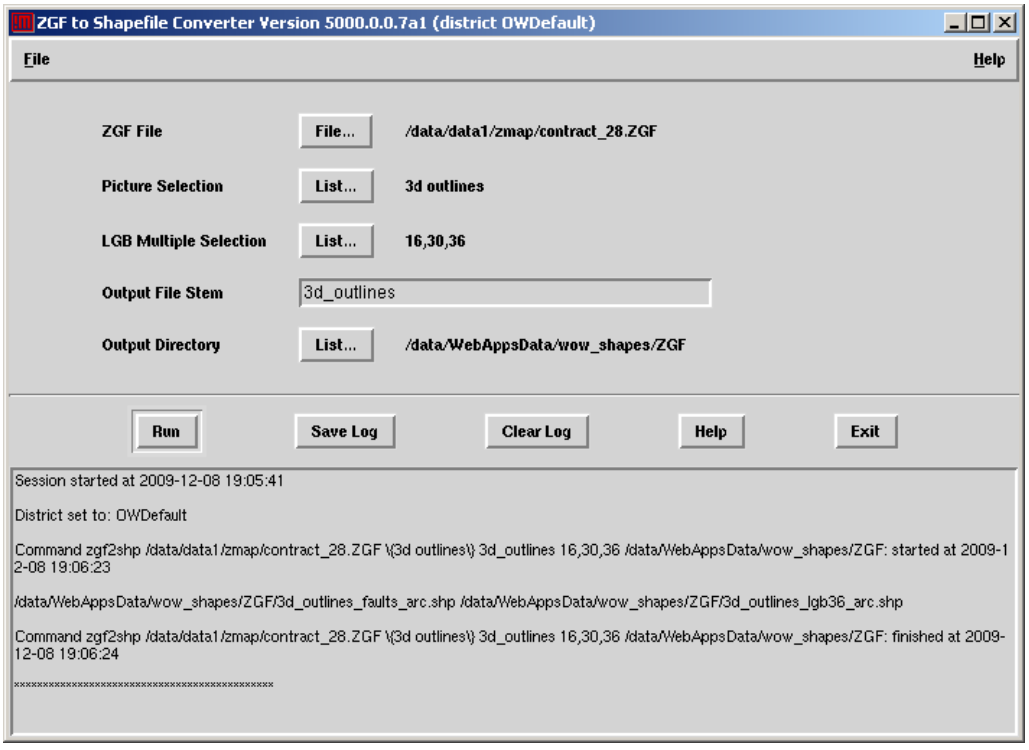
```
prompt> ls -ltr /tmp/out*
-rw-rw-r--  1 bruce users  1140 Aug 10 11:56 /tmp/outline3d_lgb36_arc.shx
-rw-rw-r--  1 bruce users 12308 Aug 10 11:56 /tmp/outline3d_lgb36_arc.shp
-rw-rw-r--  1 bruce users  2501 Aug 10 11:56 /tmp/outline3d_lgb36_arc.dbf
```

To produce geo-referenced images rather than shapefiles, use utility `zgfImage`. Use picture argument `all` to process all pictures in the specified ZGF, or specify the individual picture name:

```
prompt> zgfImage
Usage: zgfImage zgf ?picture? ?xsize? ?dir?

prompt> zgfImage /data1/zmap/contract_28.ZGF "{3d outlines}"
Processing /data1/zmap/contract_28.ZGF:3d outlines:
- image saved to:
/data/WebAppsData/wow_images/ZGF/contract_28_3d_outlines.jpg
- world saved to:
/data/WebAppsData/wow_images/ZGF/contract_28_3d_outlines.jpgw
```

An alternative way to convert a ZGF picture to a shapefile is to use the `Zgf2Shape` graphical user interface, illustrated below (there is no GUI for `zgfImage`). First source the WebApps environment then type `Zgf2Shape`:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> Zgf2Shape
```



`Zgf2Shape` may also be launched from the `wowgui` interface.

Integrating with ESRI GIS

Saving GIS Image Backdrops

ArcView and GIS is aimed predominantly at vector data. It is however possible to load raster images as backdrops to cultural information in GIS. WOW images can be exported in an ArcView-compatible format for a number of data types:

- OpenWorks grids
- Z-MAPPlus grids and pictures
- SeisWorks horizon, navigation and live trace outlines

Of the above, the most important are the raster types: OpenWorks and Z-MAPPlus grids and SeisWorks horizons. There are alternative and better methods for viewing Z-MAPPlus pictures and SeisWorks live trace outlines in ArcView.

In the relevant parts of WOW, select the `Create GIS Image` checkbox. This will save a `.jpg` file and an associated 'world file' with `.jpgw` extension, which provides ArcView with the parameters required to geo-reference the image. The image can then be viewed in ArcView as a theme, after loading the JPEG extension.

WOW will write images to `$WOW_DATA_DIR/wow_images/`…

Shapefile Creators

WOW provides the capability to convert numerous data types to shapefiles, as listed below:

- SeisWorks 2D seismic lines (projected)*
- SeisWorks 3D seismic surveys (projected)*
- SeisWorks 3D seismic live trace outlines (projected)*
- Z-MAPPlus ZGF pictures (projected)
- Z-MAPPlus MFD grid files (projected)
- OpenWorks mapping polygon and fault centerline sets (projected)*
- SeisWorks ZCM files (projected)*
- SeisWorks DTS files (projected)*
- CDA project outlines (projected)
- OpenWorks Wells, 2D lines and 3D surveys (WGS84)
- OpenWorks interpretation project outlines (WGS84)

WOW will write shapefiles to `$WOW_DATA_DIR/wow_shapes/`…

*** Important note:** Where OpenWorks projects are involved, the projected shapefile creators will look for and copy in a `.prj` file containing CRS information from the OpenWorks external data directory, if present. For example, in a project named GOM315, WOW will look for file `GOM315.prj` in directory `OW_PROJ_DATA/GOM315`.

Customizing Choice of Color Maps

WOW utilizes SeisWorks color maps (`.clm` files) in a number of functions:

- SeisWorks horizon display
- SeisWorks seismic displays
- SEG-Y image displays
- OpenWorks grid displays
- Z-MAP Plus grid displays
- ProMAX seismic displays

The choice of which color maps to use can be modified for the installation be setting environmental variables `COLOR_SOURCE1` and `COLOR_SOURCE2:`

`COLOR_SOURCE1` applies to SeisWorks only and has 3 options:

- `DEFAULT`: a short hardcoded list. For horizons, the list is: `rspectrum spectrum dipazim blkwht whtblk`. For seismic, the list is: `blkwht whtblk blkwhtrd blkwhyel bluwhtbn bluwhtrd grnwhtbn segfreq segphase segpolar segstg`.
- `DIRECTORY`: the contents of the directory `$OWHOME/WebApps/conf/clm`. You can add color map files to this directory. You can delete SOME of the files, but not the defaults listed above.
- `PROJECT`: all color maps in the first `OW_PROJ_DATA/<owproj>/SWDATA` directory.

`COLOR_SOURCE2` applies to SEG-Y, OpenWorks, Z-MAP Plus and ProMAX and has options of `DEFAULT` or `DIRECTORY` as described above.

To implement:
cd `$OWHOME/WebApps/conf`
`vi wow.env`
uncomment and edit line: `COLOR_SOURCE1=PROJECT; export COLOR_SOURCE1`
uncomment and edit line: `COLOR_SOURCE2=DEFAULT; export COLOR_SOURCE2`

The recommended setting is `DEFAULT` as this produces the shortest selection lists and therefore simpler user interfaces.

Viewing CGMs in WOW

There are two different methods of implementation: client-side plugin or server-side conversion, with advantages and disadvantages for both methods. A number of vendors provide functionality in this area, e.g. SDI (http://www.sdicgm.com) and Zeh (http://www.zeh.com). Others are mentioned below.

Important note: By default, WOW implements a converter from SDI (http://www.sdicgm.com). No further configuration should be required for simple viewing.

Client-side Plugin

A plugin is an extension to the browser that allows it to recognize a file type, in this case CGM, and provide corresponding functionality. The advantage of this is rich functionality, i.e. zoom, pan, scaled hardcopy etc. However, the entire CGM needs to download to the client; these files can be large which increases network traffic. The plugin also needs to be installed on every client system, with increased effort to install and maintain over time.

Options include Larson WebView CGM Pro (http://www.cgmlarson.com) and CGM Reader from SDI (http://www.sdicgm.com/sdiweb/cgm_reader.html). To implement, download and install the plugin as per the vendor instructions and do the following:

```
prompt> cd $OWHOME/WebApps/cgi-bin
prompt> cp file_cgm.cgi.clientside file_cgm.cgi
```

The client-side version of `file_cgm.cgi` simply copies the CGM from server to client, assuming there is a client-side plugin.

Server-side CGM to PNG converter

Rather than process the entire CGM locally, the server-side approach converts the CGM into a highly compressed, lower-resolution Web format such as a jpeg or png which is understood automatically by the browser.

The advantage of this approach is fast displays with much reduced network traffic. There is also only a single (server) installation required, rather than on a per-client basis. However the speed and simplicity are achieved by trading off against functionality. The server-side approach is adequate for a quick look but not for submitting scaled hardcopy.

WOW implements a converter from SDI (http://www.sdicgm.com) in the default `file_cgm.cgi`. This may display a watermarked image. Please contact SDI (sales@sdicgm.com) for further information.

Other command-line CGM to png converters are available from JustCroft (http://www.justcroft.com) and EasyCopy (http://myeasycopy.com). To implement these unsupported options, download and install the application as per the vendor's instructions. You will need to do the following manual configuration:

```
prompt> cd $OWHOME/WebApps/cgi-bin
prompt> cp file_cgm.cgi.serverside file_cgm.cgi
prompt> vi file_cgm.cgi
```

provide the correct info for the converter being used.

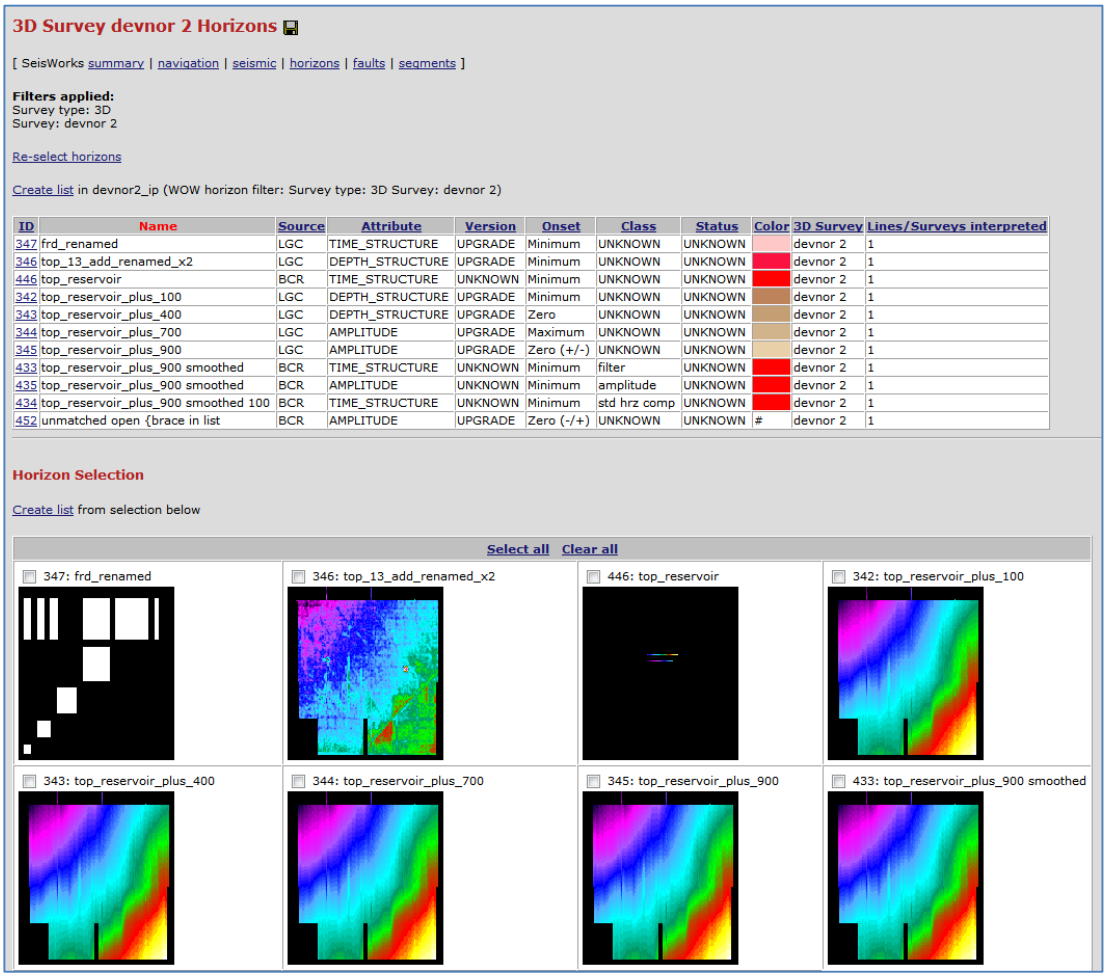
Due to the complexities of this issue and the range of possible configurations and software tools, additional services may be required to fully implement CGM viewing in WOW.

Integrating with CDA

Corporate Data Archiver (CDA) can be used to generate 'throwaway' stubs which include image thumbnails for re-use within WOW. These options are provided for OpenWorks, SeisWorks, GeoProbe, ProMAX and VIP projects. This functionality is designed to facilitate a project cleanup operation, e.g. deleting empty horizons. Note that a `CDARCHIVER` license is required in order to run CDA.

To generate these in CDA, use an archive project name of 'Stubs' to create thumbnails in a pre-determined location, for re-use in the WOW horizon list builder. Once generated, the stub can be viewed directly from a link on the SeisWorks survey summary page.

The SeisWorks horizon list builder is accessible from the 'Horizons' link on the SeisWorks project summary page. This allows viewing horizons, drilling down to view details or selecting horizons to save to a list. The web interface is illustrated below:



An alternative way to generate just horizon thumbnails is to use the CDA `HrzThumbs` utility. See the CDA Release Notes for further details.

For ZGF pictures, an alternative way to generate just picture thumbnails is to use the CDA `ZgfThumbs` utility. See the CDA Release Notes for further details.

Additional Customization Options

Customizing the Well, Field and Lease Modules

The lease module allows the editing of lease commitments, interests and remarks. Editing can be turned off for sites that prefer read-only execution. Also, descriptive names can be changed to take into account global differences, e.g. 'Lessee' has meaning in the Gulf of Mexico, whereas 'Block interests' might be more applicable in the North Sea.

The file `$OWHOME/WebApps/conf/lease_tables.dat` controls lease module labels and editing behavior. To customize the lease module:

```
prompt> cd $OWHOME/WebApps/conf
prompt> cp lease_tables.dat.default lease_tables.dat
prompt> vi lease_tables.dat
```

(example below) and change labels/edit/multi flag.

```
# If present, the lease_tables file allows site-wide overwriting
# of the default lease table labels and editing behaviour.
# format: InternalKey TableName DetailFlag Label EditableFlag
# MultiLeaseSummaryFlag
# The 4th and 5th items (Label and EditableFlag) may be changed
# If EditableFlag is 'n/a', there is no edit functionality for the table.
# The 6th item controls appearance and can be edited if not n/a
document null YES Documents YES n/a
keyfact null YES "Key Facts" YES n/a
tract lease_tract NO Tract n/a n/a
boundary tract_boundary NO Boundary n/a n/a
lessee lessee NO Interests YES YES
lessor lessor NO "Lessor Interests" YES YES
commitment lease_commitment NO Commitments YES YES
narrative lease_narrative NO Remarks YES YES
```

Similar configuration files are used to control the labels and multi-object display properties for wells, fields and basins. These cannot be edited at present through the browser.

`$OWHOME/WebApps/conf/well_tables.dat:`

```
document null YES Documents YES n/a
keyfact null YES "Key Facts" YES n/a
Picks pick NO Picks n/a YES
Curves log_crv_hdr YES Curves n/a YES
Time-Depths time_depth_curve YES "Time Depths" n/a YES
Dir-Surveys dir_survey_hdr YES "Dir Surveys" n/a YES
Posn-Logs positional_log_hdr YES "Posn Logs" n/a YES
Synthetics synthetic_seismic YES Synthetics n/a NO
Lithology computed_lithology_hdr YES Lithology n/a NO
Casing casing NO Casing n/a NO
Cores well_core NO Cores n/a NO
Shows intrp_drilg_show NO Shows n/a NO
Tests well_test NO Tests n/a NO
Dipmeter dipmeter NO Dipmeter n/a NO
Paleo paleo NO Paleo n/a NO
Zone-Attributes strat_unit_intrp NO "Zone Attributes" n/a NO
Plugging plugging NO Plugging n/a NO
DST-RFTs dst_rft_gen NO "DST RFTs" n/a NO
Interests well_interest NO Interests n/a NO
Dates well_date NO Dates n/a NO
Alt-UWIs well_uwi_alt NO "Alt UWIs" n/a NO
Well-Study well_study NO "Well Study" n/a NO
Note-Pad well_note_pad NO "Note Pad" n/a NO
Remarks well_remark NO "Remarks" n/a NO
```

Customizing the 'Key Facts' Module

The 'key facts' module allows users to 'add a note' against projects, wells, fields, leases, basins, seismic and 3D surveys. These notes are a collection of up to 10 long remarks, each up to 2000 characters in length, associated with an individual well, field or lease. The 'key facts' are implemented in the OpenWorks KRS (knowledge reference system) model.

The attributes that may be edited are controlled on a site-wide basis by the following configuration files. The required flag and display order flags are not yet implemented.

Important note: you should review and customize these before entering any documentation, as changing the structure after instantiating is non trivial.

```
# Format: ColumnName(COL01-COL20) ColumnLabel Required(Y/N) DisplayOrder
# NOTE: column labels must be 25 chars or less

$OWHOME/WebApps/conf/project_keyfacts.dat:
COL01   "Project Provenance"    N 1
COL02   "Geographic Area"       N 2
COL03   "Business Ownership"    N 3
COL04   "Business History"      N 4
COL05   "Data Mgmt Ownership"   N 5
COL06   "Data Mgmt History"     N 6
COL07   "Data Restrictions"     N 7
COL08   "Other Comments"        N 8

$OWHOME/WebApps/conf/well_keyfacts.dat:
COL01 "Well Prognosis" N 1
COL02 "Pre-Drill Risk Review" N 2
COL03 "Drilling Summary" N 3
COL04 "Tests / Shows" N 4
COL05 "Reservoir Review" N 5
COL06 "Postmortem" N 6
COL07 "Data Availability" N 7
COL08 "Scout Info" N 8
COL09 "Other Comments" N 9

$OWHOME/WebApps/conf/field_keyfacts:
COL01 "Exp/Appraisal History" N 1
COL02 "Geology" N 2
COL03 "Geophysics" N 3
COL04 "Reservoir Engineering" N 4
COL05 "Facilities" N 5
COL06 "Economics" N 6
COL07 "Development Plans" N 7
COL08 "Data Availability" N 8
COL09 "Scout Info" N 9
COL10 "Other Comments" N 10

$OWHOME/WebApps/conf/lease_keyfacts:
COL01 "Exploration History" N 1
COL02 "License History" N 2
COL03 "Geology" N 3
COL04 "Geophysics" N 4
COL05 "Structure" N 5
COL06 "Plays" N 6
COL07 "Seismic" N 7
COL08 "Data Availability" N 8
COL09 "Scout Info" N 9
COL10 "Other Comments" N 10

$OWHOME/WebApps/conf/basin_keyfacts:
COL01 "Exploration History" N 1
```

```
COL02 "Play Summary" N 2
COL03 "Stratigraphy" N 3
COL04 "Reservoir" N 4
COL05 "Source" N 5
COL06 "Seal" N 6
COL07 "Structure" N 7
COL08 "Timing" N 8
COL09 "Scout Info" N 9
COL10 "Other Comments" N 10

$OWHOME/WebApps/conf/seismic_keyfacts:
COL01 "Data Source" N 1
COL02 "Acquisition Info" N 2
COL03 "Processing Info" N 3
COL04 "Data Loading Info" N 4
COL05 "Related Seismic" N 5
COL06 "Other Comments" N 6

$OWHOME/WebApps/conf/survey_keyfacts:
COL01 "Interp Status" N 1
COL02 "Quad/Block" N 2
COL03 "Field" N 3
COL04 "Operator" N 4
COL05 "Asset" N 5
COL06 "Data Loading Info" N 6
COL07 "Data Availability" N 7
COL08 "Other Comments" N 8
```

Customizing the Comparison Module

The Comparison module allows users to compare well, field, lease and navigation headers as well as details on well position logs, curves, picks and time-depth tables.

In addition to the above, users may compare counts for any well-related reference data types. For example, do the wells have the same number of casing points in two different projects? The default option caters for cores, tests, casing, tubing, completions, perforation, liners, packers, dipmeters, shows, paleo and mud reports.

The list is customizable using the default file `well_comparison.dat.default` in `$OWHOME/WebApps/conf`. To modify the defaults, copy this file to `well_comparison.dat` and add tables as indicated by the syntax description. Note that any tables added must contain a `well_id` field.

```
#
# If present, the well_comparison.dat file allows the specification of
# additional well data types for the comparison of data between 2 OpenWorks
# projects.  Comparison will simply be on counts per well.
#
# format: TableName Label
#
well_core          Cores
well_test          Tests
casing             Casing
tubing             Tubing
well_completion    Completions
well_perforation   Perforations
liner              Liners
packer             Packers
dipmeter           Dipmeters
intrp_drilg_show   Shows
paleo              Paleontology
mud_report         "Mud Report"
```

Customizing the Well Match Module

The well match modules computes, then stores, a reference between a well in one project and a well in another project. Well matching is typically relevant where wells have different UWIs in different projects.

Well matches are stored in the `WELL_UWI_ALT` table in both projects. There may be multiple matches for the same UWI against many UWI types. For example, `API:1001423276841000` may match `NPD:12/13-14a` and also `CORP:012/13-014s1`. You must therefore choose a UWI type in each project. Only wells of the selected UWI type will be matched

The matching algorithm compares a number of attributes as listed below to determine likely matches in the target project. Each attribute is weighted according to a score. The scores and tolerances (but not the attributes) can be adjusted by editing `well_match.dat` in `$OWHOME/WebApps/conf`.

Alternatively, click on 'Admin'->'Well Matching Scores' in the WOW top bar.

```
# If present, the well_match file allows the overriding of scores and tolerances
# used when matching wells between projects.
# format: InternalKey Score Tolerance
#
# The 2nd and 3rd items (Score and Tolerance) may be changed
#
uwi             100     n/a
latlon           50     0.001
wellname         15     n/a
operator         10     n/a
spud             10     7
completion        8     7
field             6     n/a
basin             5     n/a
country           1     n/a
```

Maintenance and Troubleshooting

Apache

Apache is a freeware web server developed by the Apache Software Foundation (http://www.apache.org). Apache is the most widely used web server on the Web. It has excellent performance, is lightweight, stable, and very reliable. It should require almost no maintenance from a system administration perspective.

Apache must be started by root. If you use the standard version of Apache distributed with the operating system, then the requisite commands to start/stop Apache on system boot/shutdown will already be configured: see `/etc/init.d/httpd`. Apache will start automatically at boot time, provided `httpd.conf` exists and is correctly configured in `/etc/httpd/conf`.

To check Apache is running:
```
prompt> ps –ef | grep httpd
```

If no processes are found restart Apache manually (as root):
```
prompt> /usr/sbin/apachectl stop
prompt> /usr/sbin/apachectl start
```

If Apache is not running, and cannot be restarted, check the error log file:
```
prompt> tail /etc/httpd/logs/error_log
```

WOW Browser

Due to Apache's reliability, most errors are WOW errors and appear as an **'Internal Server Error'** in the browser. The Apache log file provides an excellent diagnostic medium. If a repeatable error occurs in some part of WOW, do the following:

1. On the WOW top bar, click on **Errors**. This will display the Apache error log contents, as well as the complete environment and WOW version number.

2. Click `Write START tag`, repeat the operation, click `Write END tag`.

3. Save this page and provide the output to your support representative for diagnosis.

WOW Command-line and GUI Utilities

The equivalent to the **Errors** link for non-browser utilities is the command-line **wow_err** script:

```
prompt> source $OWHOME/WebApps/templates/wow.login     (if C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile        (if Bourne shell)
prompt> wow_err
```

Appendix 1: Example wow.env File

```
#==========================================================================
# Name:
#       wow.env - required environment for WOW applications
#
# Usage:
#       sourced by WebApps scripts
#
# Description:
#       sets up OpenWorks, Tcl/Tk, Apache Web server environment
#
#--------------------------------------------------------------------------

#WOW_DEBUG=1; export WOW_DEBUG
#ERR_LEVEL=0; export ERR_LEVEL

#==========================================================================
# Check for OWHOME, WOW_HOME, OW_CONF_DIR, ORACLE_HOME and ORACLE_SID
# Change value of variables here if required
# Set LM_LICENSE_FILE if NOT OWHOME/lam/license.dat
#--------------------------------------------------------------------------

# OW_CONF_DIR (location of district.dat)
#OW_CONF_DIR=${OWHOME}/conf; export OW_CONF_DIR

# OWHOME and WOW_HOME
OWHOME=/apps/ow; export OWHOME
WOW_HOME=${OWHOME}/WebApps; export WOW_HOME

# Oracle
ORACLE_HOME=/apps/oracle/product/11.2.0/dbhome_1; export ORACLE_HOME
ORACLE_SID=owlinux5; export ORACLE_SID
ORACLE_LIBRARY=${OWHOME}/oracle32/instantclient/libclntsh.so.11.1;
export ORACLE_LIBRARY

# Required for Oracle wallet implementation
if [ "${OW_HOME_DIR:-""}" = "" ]; then
        HOME=/home/bruce; export HOME
        OW_HOME_DIR=${HOME}; export OW_HOME_DIR
fi

# License file
if [ "${LM_LICENSE_FILE:-""}" = "" ]; then
        LM_LICENSE_FILE=${OWHOME}/lam/license.dat; export LM_LICENSE_FILE
fi

#==========================================================================
# Set up Web server environment
# Change value of all variables here
#--------------------------------------------------------------------------

# Name of apache user
APACHE_USER=bruce; export APACHE_USER

# Fully qualified URL to web server
WOW_URL=http://linux5.exprodat.com; export WOW_URL

# WOW admin group (can edit LOVs etc.)
WOW_ADMIN_GROUP=users; export WOW_ADMIN_GROUP

# Email address to send WOW error report emails to
```

```
WOW_ADMIN_EMAIL="bruce"; export WOW_ADMIN_EMAIL

# Default email suffix (e.g. exprodat.com)
WOW_EMAIL_SUFFIX=exprodat.com; export WOW_EMAIL_SUFFIX

# Address of SMTP mail server (usually 'nslookup mailhost')
WOW_MAILSERVER=linux5; export WOW_MAILSERVER

# Security level
WOW_SECURITY=C; export WOW_SECURITY

# Default location to write WOW exported data
WOW_DATA_DIR=/data/WebAppsData; export WOW_DATA_DIR

# Number of points to display in data tables
WOW_MAXPOINTS=500; export WOW_MAXPOINTS

# Optional site label for WOW front page
#WOW_SITE_LABEL="- Company X"; export WOW_SITE_LABEL

# Where clause controlling subselect of OpenWorks projects
#OW_PROJ_WHERE="where nvl(p.remark,'blank') not like '%TIGHT%'"
#OW_PROJ_WHERE="where p.project_name not in ('PROJECT1','PROJECT2')";
export OW_PROJ_WHERE

# SQL to add extra attributes to WOW well header query
#WELL_HEADER_EXTRAS='permit_no "Permit", data_acquisition_type "Acq Type",';
export WELL_HEADER_EXTRAS

# Source of .clm files for SeisWorks images (DEFAULT/DIRECTORY/PROJECT)
#COLOR_SOURCE1=PROJECT; export COLOR_SOURCE1

# Source of .clm files for other images (DEFAULT/DIRECTORY)
#COLOR_SOURCE2=DIRECTORY; export COLOR_SOURCE2

# SeisWorks logfile
#SEISWORKS_LOGFILE=${OWHOME}/conf/swacess.log; export SEISWORKS_LOGFILE

# Show SQL in QC/QA module: 1=on 0=off
#WOW_SHOW_SQL=1; export WOW_SHOW_SQL

# Fully qualified URL to WOW 2003 server
#WOW2003_URL=http://wow2003; export WOW2003_URL

# Filter OW projects by current district or display all for SID (1=on 0=off)
#OW_DISTRICT_FILTER=1; export OW_DISTRICT_FILTER

# OpenWorks/SeisWorks listing default: pdb, ip or all
#WOW_OW_LISTING=pdb; export WOW_OW_LISTING
#WOW_SW_LISTING=ip; export WOW_SW_LISTING

# SeisWorks group by default: project or survey
#WOW_SW_GROUPING=survey; export WOW_SW_GROUPING

# Specify userids for OpenWire real-time monitoring
#OW_RTM_USERS="bruce,lmsys"; export OW_RTM_USERS

#=============================================================================
# THIS SECTION IS AUTO_GENERATED
# should not neeed to make any changes
#-----------------------------------------------------------------------------

# Apache location (should not need to change)
```

```
APACHE_HOME=/etc/httpd; export APACHE_HOME

# Web root (should not need to change)
WEB_ROOT=${WOW_HOME}/htdocs; export WEB_ROOT

# URL to web server cgi-bin directories (should not need to change)
WOW_CGI=${WOW_URL}/bin; export WOW_CGI

# SeisWorks
if [ -d ${OWHOME}/SeisWorks ]; then
    SEISHOME="${OWHOME}/SeisWorks"; export SEISHOME
fi

# set Tcl/Tk library locations
TCL_LIBRARY=${WOW_HOME}/tcltk/lib/tcl8.4; export TCL_LIBRARY
TK_LIBRARY=${WOW_HOME}/tcltk/lib/tk8.4; export TK_LIBRARY

# set LD_LIBRARY_PATH
LD_LIBRARY_PATH=${OWHOME}/lib:${ORACLE_HOME}/lib32:${OWHOME}/SeisWorks/lib:${WOW
_HOME}/tcltk/lib
export LD_LIBRARY_PATH

# ProMAX: see promax.env
```

Appendix 2: Summary of Important Files

The following table summarizes the main files used by WOW and Apache.

File/Directory	Description

`/etc/httpd/conf:`
`httpd.conf`
`.wp`
	
	Main apache configuration file
	Password file used for Apache authentication

`/usr/sbin:`
`apachectl`
`httpd`
`/usr/bin/htpasswd`
	
	Starts and stops Apache
	The Apache web server
	Creates/adds Apache passwords

`/etc/httpd/logs:`
`access_log`
`error_log`
	
	Stores all Apache server accesses
	Stores all Apache server errors for diagnostics

`/etc/httpd/logs:` `httpd.pid`	 Process ID of the Apache parent process
`$OWHOME/WebApps/bin`	Directory containing WOW executables and wrappers
`$OWHOME/WebApps/cgi-bin`	Directory containing WOW dynamic executables
`$OWHOME/WebApps/conf/sqlscripts:`	Directory containing SQL scripts used in the QC/QA section
`$OWHOME/WebApps/conf/clm, cmap, gpc:`	Directories containing color maps for use in OW, SW, ZM, VIP and GeoProbe modules
`$OWHOME/WebApps/install:`	Directory containing installation scripts

`$OWHOME/WebApps/htdocs:`
`assetjournal_data:`
`wow_reports:`
`index.html`
`wow_css.js`
`wow_relnotes.pdf`
`wow_custom.html`
	
	Directory containing links to AssetJournal parent directories
	Directory for subscription reports
	WOW start page
	WOW style sheet selector
	WOW Release Notes (this document)
	Customizable html page

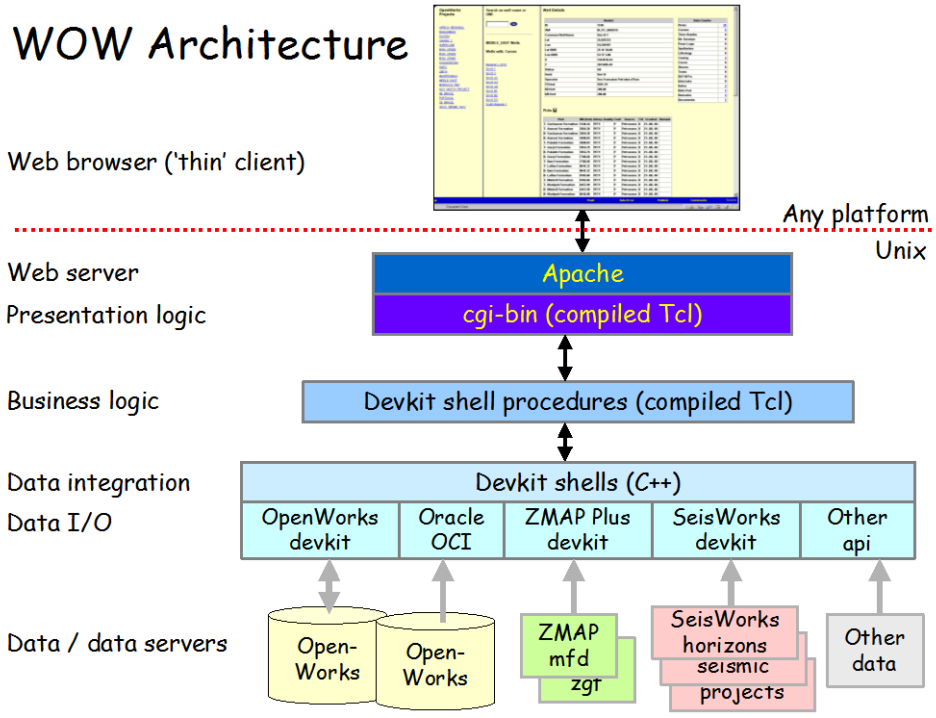
$OWHOME/WebApps/conf:	
wow.env	Main WOW configuration file – see appendix 1
webapps_version.dat	WebApps version information
wow_menu.dat	Customize WOW left frame menu
zmap_projdirs.dat	Lists of parent directories for ZMAP data
other_projdirs.dat	Lists of parent directories for 'Other' data
gp_projdirs.dat	Lists of parent directories of GeoProbe projects
vip_projdirs.dat	Lists of parent directories of VIP projects
promax_data_homes.dat	Lists of PROMAX_DATA_HOME locations
restricted_dir_list.dat	List of directories that may not be browsed in WOW
restricted_plist.dat	List of SeisWorks projects that may not be browsed in WOW
ascii_file_extensions.dat	List of ASCII extensions recognized by directory browsers
web_file_extensions.dat	List of inbuilt extensions recognized by directory browsers
well_comparison.dat	Lists of tables whose counts may be compared between wells
well_match.dat	List of attributes used for the well matching module
lease_tables.dat	Customize lease labels and whether editable
well_tables.dat	Customize well labels and multi-object display
field_tables.dat	Customize field labels and multi-object display
lease_keyfacts.dat	'Add a note' attributes for leases
well_keyfacts.dat	'Add a note' attributes for wells
field_keyfacts.dat	'Add a note' attributes for fields
basin_keyfacts.dat	'Add a note' attributes for basins
$OWHOME/WebApps/templates:	
wow.lmkrc	'Dot file' for lmksh for command-line execution
wow.login	C-shell WOW full environment
wow.profile	Bourne-shell WOW full environment
launcher.dat.extra	Launcher entries for WOW Documenter
B.htaccessB/C.htaccess	Default Apache .htaccess files

Appendix 3: WOW Architecture

The fundamental concept behind WOW is dynamic access to data. This means that the majority of content is generated on the fly programmatically by reading the underlying databases, formatting and then sending results to a Web browser.

WOW is a server-side application. There are no client-side dependencies, i.e. plug-ins to be downloaded or installed, considerably simplifying maintenance. The majority of data access is therefore done on the server, via an application API or devkit.

This architecture is designed to separate data I/O from business logic, from presentation logic as illustrated in the figure below:



Data layer: WOW currently covers OpenWorks, SeisWorks, Z-MAP Plus and other data types, including SEG-Y, LAS, Shape files etc.

Data I/O layer: This layer is comprised of the application devkits, which provide a safe mechanism for reading/writing the data stores.

Data Integration Layer: This provides an integration layer on top of the diverse devkits to allow consistent read/write of vendor data. WOW uses a number of devkit shells, which are Tcl/Tk shells extended with the underlying devkit functions.

Business Logic Layer: This layer 'wrappers' the lower-level extensions with business logic, including error checking, lists of values, numerical computations etc. This provides a consistent, modular, interface to the underlying data stores.

Presentation Layer: This layer executes the shell the web server in response to being passed a URL by a web browser. It calls procedures from the business logic layer, and formats output on the fly as html to send back to the browser.

Appendix 4: Apache Installation Options

Introduction

This section discusses options for customizing the Apache installation, such as using an existing Apache server, changing server name or port, running multiple instances, using alternative authentication methods etc.

When planning any non-default installation or customization of WOW, administrators should be aware of the critical configuration files for Apache and for WOW. Most changes, e.g. to server and port, will require editing in these three locations:

- All Apache configuration is controlled by a single file, `httpd.conf` in `/etc/httpd/conf`. This file contains the important variables such as `ServerName`, `Listen`, `User`, and `Group`.
- All WOW configuration (with the exception below) is stored in a single file, `$OWHOME/WebApps/conf/wow.env` which is sourced by all dynamic scripts.
- There are two static files in WOW which may contain hardcoded URLs. These are `index.html` and `wow_css.js` in directory `$OWHOME/WebApps/htdocs`. These may need to be edited if server name or port is changed.

Important note: Apache is a component of the operating system; it is not part of WOW. Landmark Customer Support cannot provide support for all possible configuration options of the Apache server. The notes in this section are provided as guidelines only, and any customization is at the customer's risk. For further guidance on Apache server configuration, refer to http://httpd.apache.org/docs.

Obtaining and Installing the Red Hat Linux Apache RPMs

Apache comes as an optional software package with the Red Hat Linux operating system. If installed, directory `/etc/httpd` will exist. To confirm that Apache is installed, type:

```
prompt> rpm –qa | grep httpd
```

There should be at least `httpd` version 2.0 (RHEL 4) or 2.2 (RHEL 5). If the packages are not found, please install them from the Red Hat Installation CDs.

Using an existing Apache server during install

By default, WOW installation requires a system with Apache installed but not configured or running. Sites may wish to install WOW and rather use an existing Apache, e.g. the server shipped with PowerExplorer.

To do so, run `WebAppsInstall` (or `WOWInstall` directly) with an additional `-n` flag to skip Apache configuration during installation, as illustrated below. In this example the server is `http://wow.oilco.com` and the WebApps tree is in the default `$OWHOME/WebApps` location, where `$OWHOME` is `/apps/ow`.

```
prompt> cd $OWHOME/WebApps/install
prompt> ./WebAppsInstall
Usage: WebAppsInstall -o <OpenWorks Path> [-a <WOW Path>] [-n (no
Apache config)]
prompt> ./WebAppsInstall –o $OWHOME -n
```

Using the `-n` flag bypasses the default checks for Apache being already configured or running on the install system, allowing the installation to continue with an existing server. It also skips the creation of the `root.sh` script which does the default `httpd.conf` configuration and starting of Apache. Instead, it writes an `Apache.README` file instructing the installer what to change and what to add to the existing Apache's `httpd.conf`. An example is illustrated below:

```
prompt> cat /apps/ow/WebApps/install/Apache.README
WOW requires the following directives to be set in the relevant
httpd.conf on wow.oilco.com:
User owadm (critical)
Group admins (critical)
ServerAdmin support@oilco.com (optional)
ServerName wow.oilco.com (confirm this matches the current setting)

WOW requires the following stanzas to be added to the relevant httpd.conf
on wow.oilco.com:
Alias /wow/ "/apps/ow/WebApps/htdocs/"
<Directory "/apps/ow/WebApps/htdocs">
    Options Indexes FollowSymLinks
    AllowOverride None
    Order allow,deny
    Allow from all
</Directory>
ScriptAlias /bin/ "/apps/ow/WebApps/cgi-bin/"
<Directory "/apps/ow/WebApps/cgi-bin">
    AllowOverride AuthConfig
    Options None
    Order allow,deny
    Allow from all
</Directory>
```

The setting of the `User` and `Group` directives is critical: this should be a user with read-write (interpret) access to the OpenWorks projects – typically a data loader or administrator. It should not be set to `root`, `apache`, `nobody` etc.

Changing the Apache server during install

Sites may need to install WOW on a different system from which the Apache server will eventually run. For example, WOW may need to be installed on an application server containing the OpenWorks tree, which may be exported read-only to the intended Apache server.

To achieve this, provide the hostname for the preferred Apache server rather than the default during installation. Do NOT run `root.sh` on the installation system. Then, copy this file to the intended Apache server and run the script locally.

Changing the Apache port during install

Sites may need to install WOW on a port other than the default port 80. To achieve this, specify a port-qualified value for the **WOW server full URL** during installation, i.e. `http://<host>.<domain>:<port>`.

You will need to edit `httpd.conf` and change the value of `Listen`, as described above. It may also be necessary to open up permissions on the files and directories used by the `PidFile`, `ErrorLog` and `CustomLog` variables in `httpd.conf`.

Changing the Apache server post-install

To move the WOW Apache server from one system to another, root access is required to perform the following steps:

1. Copy the `httpd.conf` file from the old to the new server.
   `prompt> /etc/httpd/conf/httpd.conf`

2. Edit the Apache configuration file to change the value of `ServerName`:
   `prompt> vi /etc/httpd/conf/httpd.conf`
   change `ServerName` to the new server (may also be commented out)

3. Edit the WOW configuration file to change the value of `WOW_URL`:
   `vi $OWHOME/WebApps/conf/wow.env`
   change `WOW_URL` to new server URL

4. If present, change all references from old to new server in `$OWHOME/WebApps/htdocs`, files `index.html` and `wow_css.js` (3 locations in each)
   `vi $OWHOME/WebApps/htdocs/index.html`
   `vi $OWHOME/WebApps/htdocs/wow_css.js`

5. Stop Apache on the old server and start Apache on the new server:
   `prompt> /usr/sbin/apachectl stop` (on old server)
   `prompt> /usr/sbin/apachectl start` (on new server)

Changing the Apache user post-install

To change the WOW Apache user after installation, root access is required to perform the following steps.

1. Edit the Apache configuration file to change the value of `User/Group`:
   `prompt> vi /etc/httpd/conf/httpd.conf`
   change `User` and `Group` to the new user's credentials.

2. Edit the WOW configuration file to change the value of APACHE_USER:
   `vi $OWHOME/WebApps/conf/wow.env`
   change `APACHE_USER` to new username
   change `HOME` to match the home directory of the APACHE_USER.

3. Stop and start Apache:
   `prompt> /usr/sbin/apachectl stop`
   `prompt> /usr/sbin/apachectl start`

Important note on file permissions: WOW contains self-configuration modules which require the Apache user have write access to the WebApps tree. Furthermore, any patches applied to the tree need to be made as a user with appropriate permissions, otherwise errors will occur. The Apache user should therefore belong to a group which has write access to the WebApps tree.

Installing Multiple Apache Servers for WOW R5000

Instructions are provided below for RHEL 4 only. In this example, a new Apache binary distribution is installed into `/usr/local/apache2` running on server `http://wow.oilco.com` port `8082`, using a duplicated WebApps tree in `$OWHOME/WebApps2` where `$OWHOME` is `/apps/ow`.

See the next section for instructions for building Apache from source for both RHEL 4 (Apache 2.0) and RHEL 5 (Apache 2.2). Building from source is an alternative where a binary distribution is not available or is unsuitable for any reason. In such cases, replace steps 1 and 2 below with the steps in the next section.

1. Obtain the Apache binary distribution. Download from http://archive.apache.org/dist/httpd/binaries/linux/; look for the latest 2.0.x version, e.g. `httpd-2.0.48-x86_64-unknown-linux-gnu.tar.gz`

2. Install Apache to a writeable local directory e.g. `/usr/local/apache2`. Use any new directory, taking care not to overwrite any existing Apache installations:
   ```
   cd /tmp
   gzip -dc httpd-2.0.48-x86_64-unknown-linux-gnu.tar.gz | tar xvf -
   cd httpd-2.0.48
   ./install-bindist.sh /usr/local/apache2
   ```

3. Configure Apache `httpd.conf` with the following changes (line numbers are approximate):
   `vi /usr/local/apache2/conf/httpd.conf`
   line 218: `Listen 8082`
   line 295: `User <WOW user>`
   line 296: `Group <group of WOW user>`
   line 305: `ServerAdmin <system administrator's email>`
   line 319: `ServerName  <WOW server hostname>:8082`
   line 381: change `AllowOverride None` to `AllowOverride AuthConfig`
   (this is an optional change to allow `.htaccess` authentication of static web pages)
   line 613: Add lines:

```
# WOW
Alias /wow/ "/apps/ow/WebApps2/htdocs/"
```

line 645: Add lines:

```
#WOW
ScriptAlias /bin/ "/apps/ow/WebApps2/cgi-bin/"
<Directory "/apps/ow/WebApps2/cgi-bin">
   AllowOverride AuthConfig
   Options None
   Order allow,deny
   Allow from all
</Directory>
```

line 945: Insert line `ErrorDocument 500 "/wow/error.html"`

4. Start Apache (as root if port is less than 80):
   `/usr/local/apache2/bin/apachectl start`

5. Duplicate the WOW software tree:
   ```
   cd $OWHOME
   mkdir WebApps2
   cd WebApps
   find . -depth -print | cpio -pdlmv ../WebApps2
   ```

6. Configure WOW:
   If the WOW URL is fully qualified in files `index.html` and `wow_css.js`, change all references from the default to the new port e.g. change `wow.oilco.com` to `wow.oilco.com:8082` (3 locations in each file).

7. Update the `wow.env` file (line numbers are approximate):
   ```
   cd $OWHOME/WebApps2/conf
   vi wow.env
   ```
   line 24: change `WOW_HOME` to `/apps/ow/WebApps2`
   line 51: change `WOW_URL` to `http://wow.oilco.com:8082`
   line 110: change `APACHE_HOME` to `/usr/local/apache2`
   Change `ORACLE_SID`, `OWSYSSID` and any other variables as appropriate.

8. Copy the `index.html` and `favicon.ico` to the web root:
   ```
   cd /usr/local/apache2/htdocs
   cp index.html index.html.orig (if it exists)
   cp $OWHOME/WebApps2/htdocs/index.html .
   cp $OWHOME/WebApps2/htdocs/favicon.ico .
   ```

9. Repeat steps above as often as is required, e.g.:
   Port: 80, Apache: default OS package, WOW: `$OWHOME/WebApps`
   Port: 8082, Apache: `/usr/local/apache2`, WOW: `$OWHOME/WebApps2`
   Port: 8083, Apache: `/usr/local/apache3`, WOW: `$OWHOME/WebApps3`
   Port: 8084, Apache: `/usr/local/apache4`, WOW: `$OWHOME/WebApps4`
   `etc.`

See PeopleSoft Solution Doc 170943 for instructions of configuring both R2003 and R5000 WOW Apache servers on the same system.

Building the Apache Server from Source

Building Apache from source is an alternative where a binary distribution is not available or is unsuitable for any reason. In this example, a new Apache binary distribution is compiled and installed into `/usr/local/apache2`. See the previous section for instructions on required WOW changes to Apache `httpd.conf`.

1. Download the Apache source from http://httpd.apache.org/download.cgi. Look for the latest stable 2.0.x version (RHEL 4) or 2.2.x (RHEL 5), e.g. `httpd-2.0.64.tar.gz` or `httpd-2.2.17.tar.gz`.

2. Build Apache and install to a writeable local directory e.g. `/usr/local/apache2`. Use any directory, taking care not to overwrite any existing installations:
```
cd /tmp
gzip -dc httpd-2.0.64.tar.gz | tar xvf -
cd httpd-2.0.64
./configure –-prefix=/usr/local/apache2
make
make install
```

Using PAM for NIS Password Authentication (RHEL 4 only)

By default WOW uses a duplicated password file `/etc/httpd/conf/.wp` to store encrypted passwords for authentication purposes. This is required for any activity if security level is C, and for write activity at level B. If a client uses NIS, i.e. if a list of users and their encrypted passwords can be obtained using `ypcat passwd`, then it is possible to authenticate directly using the Apache `mod_auth_pam` module (for Apache 2.0 on RHEL 4 only). The procedure is described below (root is required):

1. Install `mod_auth_pam.so` :
```
cp $OWHOME/WebApps/dso/mod_auth_pam.so /usr/lib64/httpd/modules
chmod 755 /usr/lib64/httpd/modules/mod_auth_pam.so
```

2. Edit `httpd.conf`, add entries to `LoadModule` section:
`vi /etc/httpd/conf/httpd.conf`.
```
LoadModule auth_pam_module modules/mod_auth_pam.so
```

3. Configure Pam:
`vi /etc/pam.d/httpd`, add the following lines:
```
#%PAM-1.0
auth       required     pam_unix.so
account    required     pam_unix.so
```
Alternative for AD:
```
auth       required     pam_stack.so service=system-auth
account    required     pam_stack.so service=system-auth
password   required     pam_stack.so service=system-auth
session    required     pam_limits.so
```

4. Edit `$OWHOME/WebApps/cgi-bin/.htaccess`, remove `AuthUserFile` line.

5. Restart Apache:
```
/usr/sbin/apachectl restart
```

Using External NIS Password Authentication (RHEL 5 only)

The mod_auth_pam.so method described above is for Apache 2.0 on RHEL 4 and will not work with Apache 2.2 on RHEL 5. Note that mod_auth_pam is no longer supported or developed: see http://pam.sourceforge.net/mod_auth_pam.

On RHEL 5 with Apache 2.2, using mod_authnz_external.so with pwauth may provide an alternative method for NIS authentication. For installation details see $OWHOME/WebApps/dso/external.README and external.tar.gz.

Using LDAP for Password Authentication

Apache 2.0 and newer includes by default the required modules for LDAP authentication.

1. Check that the httpd.conf loads the required modules:
   ```
   grep ldap_module /etc/httpd/conf/httpd.conf
   LoadModule ldap_module modules/mod_ldap.so
   LoadModule auth_ldap_module modules/mod_auth_ldap.so
   ```

   Note: on RHEL 5, mod_auth_ldap is renamed to mod_authnz_ldap:
   LoadModule authnz_ldap_module modules/mod_authnz_ldap.so.

2. Modify the .htaccess file located in $OWHOME/WebApps/cgi-bin to turn on LDAP authentication, as illustrated below (for security level B):

```
<FilesMatch "(input|delete)\.cgi$">
     AuthType basic
     AuthBasicProvider ldap      # Apache 2.2 only
     AuthName "WOW LDAP Linux"
     AuthAuthoritative off       # Apache 2.0 only
     AuthzLDAPAuthoritative off  # Apache 2.2 only
     AuthLDAPURL "ldap://xtera/ou=people,dc=cooper,dc=com?uid"
     Require valid-user
</FilesMatch>
```

The AuthLDAPURL value will be site-specific. It is the URL of the LDAP server and indicates where in the LDAP database the user information is taken from. The LDAP administrator will know what is appropriate for the site.

Additional notes:

1. Comment out the AuthBasicProvider line for Apache 2.0.

2. Use either AuthAuthoritative or AuthzLDAPAuthoritative depending on whether running Apache 2.0 or 2.2.

3. Comment out the FilesMatch lines for security level C.

See PeopleSoft Solution Doc 166075 for further information.

Using Kerberos for Password Authentication

See PeopleSoft Solution Doc 169246 for further information.

Moving the Apache Web Root (read-only $OWHOME)

WOW by default creates a Web alias from `/wow/` to `$OWHOME/WebApps/htdocs`, which is referred to as the Web Root. This location on disk contains static files, directories and links that are customizable on a site-by-site basis. If your site requires that the `$OWHOME` directory be entirely read-only, then the Web Root can be moved as described below:

1. Change the Apache alias:
   `vi /etc/httpd/conf/httpd.conf`.
   Find/edit this line: `Alias /wow/ "/new-read-write-location/htdocs/"`

2. Modify the `WEB_ROOT` variable in the `wow.env` file to the new location:
   ```
   cd $OWHOME/WebApps/conf
   vi wow.env
   WEB_ROOT=/new-read-write-location/htdocs; export WEB_ROOT
   ```

3. Copy the htdocs directory to the new read-write location:
   `cp –r $OWHOME/WebApps/htdocs /new-read-write-location`

4. Add the new location to the config file that prevent browsing above the web root:
   `vi $OWHOME/WebApps/conf/restricted_dirlist.dat`
   Add this line: `/new-read-write-location/htdocs`

5. Restart Apache:
   `/usr/sbin/apachectl restart`

In the scenario where a read-only `$OWHOME` is required, the WOW conf directory can also be moved, and linked back to `$OWHOME/WebApps`, i.e.:

```
cd $OWHOME/WebApps
cp –r $OWHOME/WebApps/conf /new-read-write-location
mv conf conf.orig
ln –s /new-read-write-location/conf
```

Appendix 5: Background on the Devkit Shells

Introduction

The 'WebApps' products WOW, Corporate Data Archiver and Project Administrator all run Tcl/Tk shells, extended with OpenWorks devkit functions. This provides a powerful yet simple mechanism for extracting information from these project data sources for display in a table, graphical user interface or Web page.

The main devkit shell `lmksh` integrates the OpenWorks, SeisWorks, Z-MAPPlus and ZGF devkits with other api's providing coverage of e.g. GeoProbe, SEG-Y and LAS files.

Other than as documented in the main body of these Release Notes, command-line usage of `lmksh` is not formally supported. This appendix is provided as an unofficial start point to those interested in scripting their own command line utilities. Please note that no support will be provided on either Tcl/Tk or on `lmksh`.

For more information on Tcl/Tk, try one of these books:

- Tcl and the Tk Toolkit, by John Ousterhout, published by Addison-Wesley 1994, ISBN 020163337X
- Practical Programming in Tcl and Tk (4th Edition), by Brent Welch, Jeffrey Hobbs & Ken Jones, published by Prentice-Hall 2003, ISBN 0130385603
- Tcl/Tk in a Nutshell, by Paul Raines & Jeff Tranter, O'Reilly 1999, ISBN 1565924339.
- Tcl/Tk: A Developer's Guide (2nd Edition), by Clif Flynt, published by Morgan Kaufmann 2003, ISBN 1558608028.

Some useful web sites:

- Main Tcl/Tk site: http://www.tcl.tk
- ActiveState (Tcl distribution): http://www.activestate.com/Products/ActiveTcl
- Tcl Wiki (getting started guide): http://wiki.tcl.tk
- Newsgroup: news:comp.lang.tcl or http://groups.google.com/groups?group=comp.lang.tcl

Running lmksh

To run `lmksh` you require a `.lmkrc` file in your home directory and to have sourced the required environment:

```
prompt> cp $OWHOME/WebApps/templates/wow.lmkrc ~/.lmkrc      (1-off)
prompt> source $OWHOME/WebApps/templates/wow.login*   (C-shell)
prompt> . $OWHOME/WebApps/templates/wow.profile       (Bourne shell)
prompt> lmksh
lmksh{1}% OWSetup                  (configures OpenWorks environment)
lmksh{2}% info commands            (lists all available commands)
lmksh{3}% info commands sdl*       (lists commands beginning with sdl)
lmksh{4}% info procs               (lists all available procedures)
lmksh{5}% info args hrzinfo        (lists arguments for specified proc)
```

Alternatively, a wrapper script is provided and linked to `$OWHOME/bin` during installation:

```
prompt> rlmksh
```

Notes on .lmkrc: you will need to copy the `.lmkrc` into the home directory of every user that wishes to run `lmksh` interactively:

```
prompt> cp $OWHOME/WebApps/templates/wow.lmkrc $HOME/.lmkrc
```

Add or uncomment the commands `OWSetup` in `.lmkrc` so you do not need to type these during every interactive session. Add or uncomment `SourceAllProcs` to load all available commands.

The lmksh Commands

There are three classes of commands:

Tcl built-in commands: This is the core Tcl language. See the Tcl `man` pages or html help at `$OWHOME/WebApps/tcltk/htmldocs/tcltk.html` for information on built-in commands. To access the man pages:

```
prompt> source $OWHOME/WebApps/templates/wow.login
prompt> man <cmd>
```

Extended commands: These are added to `lmksh` to provide scripted access to devkit functions. The extended commands are usually low-level with little error trapping. Most begin with `sdl_` (SeisWorks), `ow_` (OpenWorks), `sil_` (MFD), `zgf_` (ZGF), `sgy_` (SEGY) and `gen_` (LAS and others). To see the arguments for an extended command, type the command name, e.g.:

```
lmksh{7}% ow_poslog
```

Procedures: These are additional 'wrappers' to the extended commands, including more robust error trapping and other business logic to make the low-level commands more useful. To see the arguments for any procedure, e.g.:

```
lmksh{8}% info args GetPoslog
```

OpenWorks database access procedures usually start with a lowercase letter to denote that they require an Oracle database connection to be established first, e.g.:

```
prompt> rlmksh
lmksh{9}% set lda [OWoralogon]
lmksh{10}% getWellLists TESTDATA
lmksh{11}% oralogoff $lda
```

Exposing lmksh Commands

It is sometimes more convenient to run `lmksh` procedures through a regular Bourne- or C-shell. A wrapper script is provided in `$OWHOME/WebApps/bin` for this purpose. To 'expose' any `lmksh` procedure on the command line, create a link as illustrated below:

```
prompt> cd $OWHOME/WebApps/bin
prompt> ln –s wlmksh <proc>
```

The procedure can then be run on the command line, with any required parameters passed through to the underlying `lmksh`.

Warning

WOW and CDA are largely read-only applications. But the underlying `lmksh` has additional destructive options, e.g. the ability to create, rename and delete SeisWorks horizons. Use of these options is entirely at your own risk, and you should always ensure you have a current backup before proceeding.

Appendix 6: WOW Functionality Checklist

OpenWorks

Multi-Project

- summarize projects, reporting main data type counts across multiple projects
- search for objects (wells/fields/leases/lines/surveys) across multiple projects
- apply a standard or user defined QC/QA query across multiple projects
- compare 2 projects, reporting differences in attributes for the main data types
- match wells between projects that have a different UWI scheme
- show project create info with CRS info for all projects
- subscribe to notification of changed/new data in registered areas of interest

Project Header

- display project header with CRS details
- convert X/Y<->Lat/Long
- display associated Interpretation projects
- summarise project by object counts over all main data types, drilldown or filter
- view side-by-side with R2003 project (if configured)
- show external data directories with drill down to detail
- show any linked AssetJournal projects
- request or view existing archive stub

Wells

- advanced well filter by multiple criteria
- display well headers in a multi-well table
- show multi-well summary with counts of and drilldown to the main data types
- tabulate well vs. curve mnemonic in a curve matrix
- tabulate well vs. pick name in a pick matrix
- create well list from filtered/selected wells
- display single well header with counts and drilldown to well data subtypes
- convert arbitrary MD<->TVD,X,Y in a well
- edit well remark and edit well object remarks
- display/add well documents
- display/add extended well documentation in the key facts module
- display well picks (plus interpolate TVD, TVDSS, TWT, X, Y for picks)
- display log curves (plus drill down for digits/detail)
- export all/selected curves in LAS format
- display checkshots (plus drill down for digits/image)
- display synthetics (plus drill down for digits/image)
- display dir surveys (plus drill down for digits/detail)
- display position logs (plus drill down for digits/ image)
- display lithology (plus drill down for digits/detail)
- display dipmeter (plus drill down for digits/detail)
- display headers for casing, cores, shows, tests, paleo, zone attributes
- display headers for plugging, DST/RFTs, interests, dates, alt UWI, well study
- display well notepad and remarks

Fields, Lease & Basins

- display field headers, interests and boundary
- display/launch/add field documents
- display/add extended field documentation in the key facts module
- display lease headers, interests and remarks
- display/add lease documents
- display/add extended lease documentation in the key facts module
- display basin headers
- display/add basin documents
- display/add extended basin documentation in the key facts module

Documents

- display all KRS documents
- display document headers
- modify document header attributes
- link a document to a well, field, lease, basin, line or survey
- delete document and its links
- display/add survey and/or line documents

SeisWorks Data

- advanced filter by multiple criteria
- display 2D/3D survey headers
- display 2D lines
- display 3D surveys
- display/add survey and/or line documents
- drill into corresponding SeisWorks project
- filter/display seismic data
- filter/display horizon data

Interpretation Data

- display grid headers and grid images
- display pointset headers and pointset details
- display mapping polygon headers and details
- display wavelet headers and images
- display velocity model headers
- display velocity model digits (TDQ models only; not DepthTeam Express)
- display interpretation notes
- display interpretation sets and link to data objects
- display geoshape set headers and details
- display geotiff images (requires plug-in)
- display vertical images
- display XYZ function sets and samples
- execute stored queries with variable substitution
- save well lists from well-based stored queries
- edit remarks for most interpretation data types

Admin

- display tables in Oracle project schema with table/column descriptions
- display VC tables list with data counts
- display individual VC table list of values
- display R_ tables list with data counts
- display individual R_ table list of values
- display stratigraphic column headers
- display surfaces and units for an individual stratigraphic column
- display users with project access rights and interpreter count
- display interpreters for an individual project user

QC/QA

- show customisable list of cross-project QC/QA queries
- execute multiple selected queries against an individual project
- edit queries in the browser
- create lists if query is of type well, field or lease
- drilldown to well, field or lease summary page

SeisWorks

Project Header

- display survey list divided between 3D and 2D projects
- display all survey details in a table with data counts
- search across 3D projects for named horizons and seismic volumes
- search across 2D projects for named lines
- display header with counts of data objects and drilldown to detail
- view storage directory contents
- display any linked AssetJournal projects
- generate or view existing archive stub (requires CDA license)

Navigation

- display project navigation header with basemap image
- overlay basemap image with optional ZGF picture
- convert basemap to GIS image
- convert navigation line/trace<->X/Y
- display/export 2D line or 3D survey navigation details with shapefile output option
- display 2D line length/trace spacing

Seismic

- display seismic line/volume headers
- display seismic sections/timeslice images
- display outline of live seismic traces
- display/export seismic trace data
- display 2D line vs. proclev matrix
- display associated long remarks
- view process history

Horizons

- display horizon headers
- display horizons with optional CDA-generated thumbnails
- display horizon statistics (% coverage)
- display horizon basemap images
- export horizon GIS image
- display/export horizon values
- display 2D line vs. horizon matrix
- list 2D lines containing interpretation for a selected horizon

Other

- display fault plane headers
- display fault segment headers
- display list of storage area files selectable by name, date, size and owner
- drill down to file details for most SeisWorks file types
- display color map (.clm) file as image
- display mapping file (.dts) header
- display mapping file polygon data with shapefile output option
- display mapping file grid as an image
- display zone control map (.zcm) file polygons with shapefile output option
- display SEGY/LAS file contents
- display MFD/ZGF file contents

Directory Browsing Modules

All Modules

- browse directory tree and view directory files
- view file attributes: owner, size, modify date, access date
- filter by file name, size and modify date

Z-MAPPlus

- search for MFD/ZGF internal file/picture names
- display MFD file internal file headers
- display grid header, statistics and image
- convert grid to GIS image
- display non-grid file header plus data
- convert non-grid data to ArcView shapefile format
- display ZGF file internal picture headers
- display ZGF picture image
- convert ZGF pictures to ArcView shapefile format
- display common ASCII file formats (e.g. .fmt, txt, .dat, .zcl)
- document MFDs, ZGFs and their internal contents

AssetJournal

- search through projects for matching text
- display AssetJournal project index or table of contents page
- display project internal html/gif/jpg contents

- display and request publishing of shared AssetJournal projects
- link AssetJournal project to an OpenWorks object as a KRS document

Other Data

- display common ASCII file formats (e.g. .dat, .txt)
- display common web file formats (e.g. .gif, .jpg, .pdf)
- display CGM files as images
- display SEGY EBCDIC/binary headers
- display SEGY trace headers, data and statistics
- display SEGY images
- display LAS headers
- display LAS curve images
- display SHP (shapefiles) as images
- download LAS files
- display DBF (.dbf) file contents
- display APR (.apr) project contents
- display DGN (.dgn) files as images
- display .tar, .Z and .gz compressed file contents
- display EarthVision 2D and 3D grid formats
- display VIP VDB file/directory contents

GeoProbe

Project Header

- display project list with drilldown to detail option
- display project summary with counts of and drilldown to the different data types
- search across projects for files and/or documentation
- display project header page with data counts
- generate or view existing archive stub (requires CDA license)
- create or update project-level documentation
- set up copy/rename/delete/link/move operations on project files

Volumes

- display volume headers with CDA thumbnails if generated
- display volume details with trace values and images

Surfaces

- display surface headers with CDA thumbnails if generated
- display surface details with statistics and images

Horizons

- display horizon headers with CDA thumbnails if generated
- display horizon details with statistics and images

Other Data Types

- display point file headers with drilldown to data values

- display fault file headers with drilldown to data values
- display well file headers with drilldown to marker/curve headers
- display colormaps with drilldown to RGB values and images
- display state file headers with drilldown to objects referenced in state files
- document volume, surface, horizon, point, fault, well, colormaps or lease objects
- display all project documentation

VIP

- display all VBD file attributes
- display VDB summary info with case headers plus CDA thumbnails if generated
- generate or view existing archive stub (requires CDA license)
- browse VDB directory files
- display VBD case summary with data counts and plot/variable/grid headers
- display plot classes with graphs of variables vs. time + observed data if present
- drill down to view actual plot data for given item and variable
- display initialization variables with images of variables per layer
- display recurrent variables with images of variables per layer per timestep
- display ternary diagrams of initial and recurrent variables
- display lists of grids, timesteps and perforations with start/end flow type
- display any well data

ProMAX

Areas

- supports multiple PROMAX_DATA_HOME locations
- show area headers with no. lines
- search for lines across areas
- view ProMAX config_file
- drill down to line list
- generate or view existing archive stub (requires CDA license)

Lines

- show line headers with no. flows/datasets/tables/OPFs
- search for flows across lines
- drill down to line details

Flows

- show flow headers
- drill down to show packet contents and job output

Datasets

- show dataset headers with sizes
- drill down to dataset details showing header and ensembles
- drill down to ensemble details
- view trace data as image
- view single trace headers and sample values
- view a trace header attribute for all traces

Parameter Tables

- show table headers with types
- drill down to show table header plus data

OPFs

- list OPFs
- drill down to show OPF attributes
- drill down to OPF attribute details
- view 2D cross plot of OPF attributes
- view OPF tabular data

Miscellaneous

- save results to Excel on PC or Linux file (all modules)
- report data errors context-sensitive (all modules)
- change SeisWorks/OpenWorks district/instance in multi-district sites
- display WOW Apache error log plus environment for customer support
- launch release notes
- link to Corporate Data Archiver (requires additional license)
- link to Project Administrator (requires additional license)
- hide ‘tight’ OpenWorks projects
- hide ‘tight’ SeisWorks projects
- hide ‘tight’ Linux directories
- validate user access against Linux credentials
- modify WOW configuration files (administrators only)

Appendix 7: WOW Documenter Attributes Migration to R5000

Seismic Attributes

PIM_SEIS_INFO	3D Upgrade Path	2D Upgrade Path	Notes
PROJECT	None	None	Not relevant
SEISMIC	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute DATA_FILE_NAME
TIME_DEPTH	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute Z_DOMAIN
POLARITY	Copy into SEISMIC_DATA_SET field	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
PHASE	Copy into SEISMIC_DATA_SET field	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
SEIS_CLASS	Copy into SEISMIC_DATA_SET attribute SEISMIC_CLASS	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
SEIS_STATUS	Copy into SEISMIC_DATA_SET attribute INTERPRETATION_STATUS	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	If all instances of PIM_SEIS_INFO associated with the same 2D proclev don't have the same CLASS and STATUS values, then the class and status value of the last WOW record encountered will be used to populate these fields in the new model.
DATA_SOURCE	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	
SAMP_FMT	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute BINARY_DATA_FORMAT
SAMP_RATE	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute Z_SAMPLE_RATE
TIME_MIN	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute Z_START
TIME_MAX	None	None	Value is computable from the SEISMIC_DATA_SET table, i.e. Z_START+(Z_NPTS-1)*Z_SAMPLE_RATE
LINE_MIN	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute LINE_MIN
LINE_MAX	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute LINE_MAX
TRACE_MIN	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute TRACE_MIN
TRACE_MAX	None	None	Value will be migrated from the seismic data file to the SEISMIC_DATA_SET table, attribute TRACE_MAX
NO_TRACES	Copy into SEISMIC_DATA_SET attribute NUM_TRACES	None	Values didn't apply to 2D in pim
PERCENT_COV	Copy into SEISMIC_DATA_SET attribute PERCENT_COV	None	Values didn't apply to 2D in pim
NO_EXTENTS	Copy into SEISMIC_DATA_SET attribute NO_EXTENTS	None	Values didn't apply to 2D in pim

TOTAL_SIZE	Copy into SEISMIC_DATA_SET attribute TOTAL_SIZE	None	Values didn't apply to 2D in pim
OPT_DISPLAY_SCALE	Copy into SEISMIC_DATA_SET attribute SCALE_DISPLAY	Copy into each SEISMIC_DATA_SET attribute SCALE_DISPLAY entry associated with the proclev.	
ACQUIRED_BY	Copy into SEISMIC_DATA_SET attribute ACQUIRED_BY	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
ACQUISITION_DATE	Copy into SEISMIC_DATA_SET attribute ACQUISITION_DATE	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
PROCESSED_BY	Copy into SEISMIC_DATA_SET attribute PROCESSED_BY	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
PROCESSING_DATE	Copy into SEISMIC_DATA_SET attribute PROCESSED_DATE	Copy into each SEISMIC_DATA_SET entries associated with the proclev.	
LOADED_BY	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	
LOADING_DATE	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	
PARENT_SEISMIC	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	
SEGY_EBCDIC_HEADER	Added to SEISMIC_DATA_SET_REMARK Type = EBCDIC_HDR	Added to SEISMIC_DATA_SET_REMARK Type = EBCDIC_HDR	
SEGY_BINARY_HEADER	Added to SEISMIC_DATA_SET_REMARK Type = BINARY_HDR	Added to SEISMIC_DATA_SET_REMARK Type = BINARY_HDR	
ASSOC_TAG	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	
REMARKS	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	Added to SEISMIC_DATA_SET_REMARK Type = SW_GENERAL	
CREATE_DATE	None	None	
CREATE_USER_ID	None	None	
UPDATE_DATE	None	None	
UPDATE_USER_ID	None	None	

Horizon Attributes

PIM_HRZ_INFO	3D Upgrade Path	2D Upgrade Path	Notes
PROJECT	None	None	Not relevant
HRZ_NUMBER	None	None	Not relevant
HRZ_NAME	None	None	Value will be migrated from the horizon index file to the OW model.
HRZ_TYPE	None	None	Value will be migrated from the horizon index file to the OW model.
HRZ_ONSET	None	None	Value will be migrated from the horizon index file to the OW model.
COLOUR	None	None	Value will be migrated from the horizon index file to the OW model.
STORED_MIN	None	None	Min value in new model will be computed as part of upgrade from the data.
STORED_MAX	None	None	Max value in new model will be computed as part of upgrade from the data.
RECOMP_MIN	None	None	Not relevant

RECOMP_MAX	None	None	Not relevant
MEAN	None	None	Mean in new model will be computed as part of upgrade from the data.
PERCENT_COV	None	None	Percent coverage value in new model will be computed as part of upgrade from the data.
HRZ_INTERP_SOURCE	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
HRZ_APPL_SOURCE	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
PARENT_HRZ_NAME	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
HRZ_CREATE_DATE	Ignore value in WOW model. Copy the creation date from the horizon data file header into ORIG_CREATE_DATE in HORIZON_DATA	None date field in WOW is free format. Too difficult to interpret	From all the HORIZON_DATA records associated with a HORIZON_ATTRIBUTE_HDR record, copy the oldest ORIG_CREATE_DATE into the ORIC_CREATE_DATE field in HORIZON_ATTRIBUTE_HDR. Not doing yet.
STRAT_UNIT_NAME	Fill out the picksurf field in R_HORIZON_NAME with this value if the value actually exists in the strat column.	Fill out the picksurf field in R_HORIZON_NAME with this value if the value actually exists in the strat column.	
SEISMIC_FILE	Use the seismic data set id for this volume on this survey	Use the seismic data set id for this volume on this line.	
HRZ_STATUS	Copy into HORIZON_DATA field	Copy into HORIZON_DATA field	
HRZ_CLASS	Copy into HORIZON_ATTRIBUTE_HDR	Copy into HORIZON_ATTRIBUTE_HDR	If all instances of PIM_HRZ_INFO associated with the same Horizon name don't have the same CLASS and STATUS values, then the class and status value of the last WOW record encountered will be used to populate these fields in the new model.
DTS_FILE	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
PARENT_HRZ_NAME2	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
ASSOC_TAG	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
REMARKS	Added to HORIZON_DATA_REMARK Type = SW_GENERAL	Added to HORIZON_ATTRIBUTE_REMARK Type = SW_GENERAL	
CREATE_DATE	None	None	
CREATE_USER_ID	None	None	
UPDATE_DATE	None	None	
UPDATE_USER_ID	None	None	

Structure of Remark Data

For each PIM_SEIS_INFO record associated with a 3D project, three remark records will be created that are associated with the SEISMIC_DATA_SET instance in OW. A SEISMIC_DATA_SET_REMARK 'long remark' of type SW_GENERAL will contain the fields in the WOW model that don't map to the OW R5000 model directly including the contents of the remark field. A SEISMIC_DATA_SET_REMARK 'long remark' of type EBCDIC_HDR will contain the EBCDIC header and a SEISMIC_DATA_SET_REMARK of type BINARY_HDR will contain the Binary header.

For each PIM_SEIS_INFO record associated with a 2D project (one per proclev), three remark records will be created that are associated with each SEISMIC_DATA_SET instance in OW with the same proclev. A SEISMIC_DATA_SET_REMARK 'long remark' of type SW_GENERAL will contain the fields in the WOW model that don't map to the OW R5000 model directly including the contents of the remark field. A SEISMIC_DATA_SET_REMARK 'long remark' of type EBCDIC_HDR will contain the EBCDIC header and a SEISMIC_DATA_SET_REMARK of type BINARY_HDR will contain the Binary header.

For each PIM_HRZ_INFO record associated with a 3D project, one HORIZON_DATA_REMARK of type SW_GENERAL 'long remark' will be created that is associated with the HORIZON_DATA instance in OW. It will contain the fields in the WOW model that don't map to the OW R5000 model directly including the contents of the remark field.

For each PIM_HRZ_INFO record associated with a 2D project, one HORIZON_ATTRIBUTE_REMARK of type SW_GENERAL 'long remark' will be created that is associated with the HORIZON_ATTRIBUTE_HDR instance in OW. It will contain the fields in the WOW model that don't map to the OW R5000 model directly including the contents of the remark field.

Viewing Metadata Post-Migration

Attributes are most readily viewed in the Seismic Data Manager. Many attributes are visible in the tables for seismic and horizons; note however that not all are shown by default, and it may be necessary to click on the *Select columns* icon and check additional required attributes for display.

To view metadata migrated into the 'long remarks', select any seismic or horizon row, right-click to bring up the context menu, then select option *View long remarks*. This brings up a new window in which remarks may be viewed edited or deleted.

In addition, long remarks and selected metadata attributes may be viewed in the SeisWorks Seismic View, menu items *Seismic -> Info* and *Horizon -> Attributes*.

Contacting Landmark Customer Support

Landmark software operates Technical Assistance Centers (TACs) in Australia, the United Kingdom, and the United States. Additional support is also provided through local support offices around the world.

Support via Web Portal

Support information is always available on the Landmark Customer Support internet page. You can also submit a support request directly to Landmark Customer Support though the Landmark Customer Support Portal:

http://css.lgc.com/InfoCenter/index?page=home

To request support in the Landmark Customer Support Portal:

1. In the **PIN** and **Password** text boxes in the Please Sign In area, enter your registered personal identification number and password.
2. Click the **Sign In** button.
3. In the Case & Defect Information area, click the **Create a New Case** link.
4. In the **Create Case** area, fill in the necessary information. Provide details about your technical concern, including any error messages, the workflow steps where the problem occurred, and attachments of screen shots that display the problem. To help understand the concern, you can also attach other files too, such as example data files.
5. Click the **Submit** button. A support analyst in the nearest Technical Assistance Center will respond to your request.

Technical Assistance Centers

Asia, Pacific 8:00 am - 5:00 pm Local Time Monday-Friday, excluding holidays	**61-8-9481-4488 (Perth, Australia)** **Toll Free 1-800-448-488** Fax: 61-8-9481-1580 Email: apsupport@lgc.com
Europe, Africa, Middle East 9:00 am - 5:30 pm Local Time Monday - Friday, excluding holidays	**44-1372-868686 (Leatherhead, UK)** Fax: 44-1224-723260 (Aberdeen, UK) Fax: 44-1372-868601 (Leatherhead, UK) Email: support@lgc.com
Latin America (Spanish, Portuguese, English) 7:00 am - 5:00 pm Local Time	**713-839-3405 (Houston, TX, USA)** Fax: 713-839-3646 Email: soporte@lgc.com
North America 7:30 am - 5:30 pm Central Standard Time Monday - Friday, excluding holidays	**713-839-2200 (Houston, TX, USA)** **Toll Free 1-877-435-7542** **(1-877-HELP-LGC)** Fax: 713-839-2168 Email: support@lgc.com

Regional Offices

For contact information for regional offices, see the Contact Support page located at:

http://css.lgc.com/InfoCenter/index?page=contact&section=contact

If problems cannot be resolved at the regional level, an escalation team is called to resolve your incidents quickly.

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3D Drill View, 3D Drill View KM, 3D Surveillance, 3DFS, 3DView, Active Field Surveillance, Active Reservoir Surveillance, 3D Drill View, 3D Drill View KM, 3D Surveillance, 3DFS, 3DView, Active Field Surveillance, Active Reservoir Surveillance, Adaptive Mesh Refining, ADC, Advanced Data Transfer, Analysis Model Layering, ARIES, ARIES DecisionSuite, Asset Data Mining, Asset Decision Solutions, Asset Development Center, Asset Development Centre, Asset Journal, Asset Performance, AssetConnect, AssetConnect Enterprise, AssetConnect Enterprise Express, AssetConnect Expert, AssetDirector, AssetJournal, AssetLink, AssetLink Advisor, AssetLink Director, AssetLink Observer, AssetObserver, AssetObserver Advisor, AssetOptimizer, AssetPlanner, AssetPredictor, AssetSolver, AssetSolver Online, AssetView, AssetView 2D, AssetView 3D, BLITZPAK, CasingLife, CasingSeat, CDS Connect, Channel Trim, COMPASS, Contract Generation, Corporate Data Archiver, Corporate Data Store, Data Analyzer, DataManager, DataStar, DBPlot, Decision Management System, DecisionSpace, DecisionSpace 3D Drill View, DecisionSpace 3D Drill View KM, DecisionSpace AssetLink, DecisionSpace AssetPlanner, DecisionSpace AssetSolver, DecisionSpace Atomic Meshing, DecisionSpace Desktop, DecisionSpace Nexus, DecisionSpace Reservoir, DecisionSuite, Deeper Knowledge. Broader Understanding., Depth Team, Depth Team Explorer, Depth Team Express, Depth Team Extreme, Depth Team Interpreter, DepthTeam, DepthTeam Explorer, DepthTeam Express, DepthTeam Extreme, DepthTeam Interpreter, Desktop Navigator, DESKTOP-PVT, DESKTOP-VIP, DEX, DIMS, Discovery, Discovery 3D, Discovery Asset, Discovery Framebuilder, Discovery PowerStation, DMS, Drillability Suite, Drilling Desktop, DrillModel, Drill-to-the-Earth-Model, Drillworks, Drillworks ConnectML, DSS, Dynamic GeoModeling, Dynamic Reservoir Management, Dynamic Surveillance System, EarthCube, EDM, EDM AutoSync, EDT, eLandmark, Engineer's Data Model, Engineer's Desktop, Engineer's Link, ESP, Event Similarity Prediction, ezFault, ezModel, ezSurface, ezTracker, ezTracker2D, FastTrack, Field Scenario Planner, FieldPlan, For Production, FrameBuilder, FZAP!, GeoAtlas, GeoDataLoad, GeoGraphix, GeoGraphix Exploration System, GeoLink, Geometric Kernel, GeoProbe, GeoProbe GF DataServer, GeoSmith, GES, GES97, GESXplorer, GMAplus, GMI Imager, Grid3D, GRIDGENR, H. Clean, Handheld Field Operator, HHFO, High Science Simplified, Horizon Generation, I^2 Enterprise, iDIMS, Infrastructure, Iso Core, IsoMap, iWellFile, KnowledgeSource, Landmark *(as a service)*, Landmark *(as software)*, Landmark Decision Center, Landmark Logo and Design, Landscape, Large Model, Lattix, LeaseMap, LithoTect, LogEdit, LogM, LogPrep, Magic Earth, Make Great Decisions, MathPack, MDS Connect, MicroTopology, MIMIC, MIMIC+, Model Builder, NETool, Nexus *(as a service)*, Nexus *(as software)*, Nexus View, Object MP, OpenBooks, OpenJournal, OpenSGM, OpenVision, OpenWells, OpenWire, OpenWire Client, OpenWire Server, OpenWorks, OpenWorks Development Kit, OpenWorks Production, OpenWorks Well File, PAL, Parallel-VIP, Parametric Modeling, Permedia, PetroBank, PetroBank Explorer, PetroBank Master Data Store, PetroStor, PetroWorks, PetroWorks Asset, PetroWorks Pro, PetroWorks ULTRA, PlotView, Point Gridding Plus, Pointing Dispatcher, PostStack, PostStack ESP, PostStack Family, Power Interpretation, PowerCalculator, PowerExplorer, PowerExplorer Connect, PowerGrid, PowerHub, PowerModel, PowerView, PrecisionTarget, Presgraf, PressWorks, PRIZM, Production, Production Asset Manager, PROFILE, Project Administrator, ProMAGIC, ProMAGIC Connect, ProMAGIC Server, ProMAX, ProMAX 2D, ProMax 3D, ProMAX 3DPSDM, ProMAX 4D, ProMAX Family, ProMAX MVA, ProMAX VSP, pSTAx, Query Builder, Quick, Quick+, QUICKDIF, Quickwell, Quickwell+, Quiklog, QUIKRAY, QUIKSHOT, QUIKVSP, RAVE, RAYMAP, RAYMAP+, Real Freedom, Real Time Asset Management Center, Real Time Decision Center, Real Time Operations Center, Real Time Production Surveillance, Real Time Surveillance, Real-time View, Reference Data Manager, Reservoir, Reservoir Framework Builder, RESev, ResMap, RTOC, SCAN, SeisCube, SeisMap, SeisModel, SeisSpace, SeisVision, SeisWell, SeisWorks, SeisWorks 2D, SeisWorks 3D, SeisWorks PowerCalculator, SeisWorks PowerJournal, SeisWorks PowerSection, SeisWorks PowerView, SeisXchange, Semblance Computation and Analysis, Sierra Family, SigmaView, SimConnect, SimConvert, SimDataStudio, SimResults, SimResults+, SimResults+3D, SIVA+, SLAM, SmartFlow, smartSECTION, smartSTRAT, Spatializer, SpecDecomp, StrataAmp, StrataMap, StrataModel, StrataSim, StratWorks, StratWorks 3D, StreamCalc, StressCheck, STRUCT, Structure Cube, Surf & Connect, SurfNet, SynTool, System Start for Servers, SystemStart, SystemStart for Clients, SystemStart for Servers, SystemStart for Storage, Tanks & Tubes, TDQ, Team Workspace, TERAS, T-Grid, The Engineer's DeskTop, Total Drilling Performance, TOW/cs, TOW/cs Revenue Interface, TracPlanner, TracPlanner Xpress, Trend Form Gridding, Trimmed Grid, Turbo Synthetics, Unconventional Essentials, VESPA, VESPA+, VIP, VIP-COMP, VIP-CORE, VIPDataStudio, VIP-DUAL, VIP-ENCORE, VIP-EXECUTIVE, VIP-Local Grid Refinement, VIP-THERM, WavX, Web Editor, Well Cost, Well H. 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