The cost and economic risk of developing deep water, subsalt, or unconventional plays is high. Permedia™ Petroleum Systems software models basin-scale processes over geological time to help geoscientists evaluate source rock potential, migration, reservoir trap and seal characteristics and fluid composition prediction. The software includes a basin simulator to forward model pressures and temperatures as input to the petroleum migration simulator. Integrating basin simulation results into exploration workflows can help assess the viability of petroleum exploration and production assets, mitigate risk, and highlight optimum carbon content sweet spots.

**KEY FEATURES**
- The best fluid migration simulator in the industry
- End-to-end 1D, 2D, and 3D petroleum systems modeling workflow
- Comprehensive source rock modeling
- Extensible; add custom reactions and algorithms via scripts and plug-ins
- Work at any length scale; evaluate petroleum flow and emplacement ranging from core to basin scales
- Co-render and analyze data from multiple packages and across all length scales
- Works with existing data and applications

*Basin scale migration results, showing accumulations.*
**BENEFITS**

For basin modelers, Permedia Petroleum Systems software provides the ideal platform for quantifying volumes and fluid properties and evaluating petroleum containment potential and emplacement patterns.

**Basin-to-reservoir-scale models**

Permedia simulation technology enables integration of regional, basin, and reservoir datasets in a single environment, showing the big picture and the details on the relationships between exploration and production.

![Detailed mass tracking with Genetic tracers.](image)

**Better assess frontier exploration risk**

Advanced high-resolution simulation of petroleum fluid flow within basin- and reservoir-scale models enables geoscientists to better assess the elements of frontier exploration risk such as source, migration, reservoir, seal, and trap. It also improves confidence in predicting reservoir potential by reflecting parameter uncertainties and quantifying risk associated with basin and reservoir-scale models.

**Optimize asset development**

The software offers fluid-based workflows such as trap volume analysis, reserve estimation, seal analysis, reservoir compartmentalization analysis, petroleum composition, and quality analysis to ensure high value application in asset development of deepwater, sub-salt, and unconventional scenarios. This includes heavy oil, shale, and the complex reservoir geometries of tight gas sands.
FEATURES

Permedia Petroleum Systems software provides a complete end-to-end workflow for basin modeling: build sophisticated earth models, forward model pressures and temperatures, add source generation and seal characteristics, and migrate fluids using the most advanced simulator in the industry.

Petroleum migration

Permedia software’s next-generation migration simulator builds on our experience from the last 15 years of petroleum migration modeling, delivering the most advanced and feature-complete migration simulator on the market.

Features include:

• Speed – Run simulations in a fraction of the time of other simulators, in both 2D and 3D. Simulations of the most complex models run in just minutes to a few hours.

• Native mesh support – Run simulations on Permedia, PetroMod™, Temis, GOCAD®, and other meshes, without any conversion.

• Multi-component – Transport algorithms are designed from the ground up to handle multi-components using a flexible reactants and reactions scheme.

• Tracers – Track component origins based on facies, layer, category maps, or any property. Use Genetic tracers to identify the pedigree of petroleum in any accumulation and calculate loss rates between source and trap.

• Reactions – Model the effects of secondary cracking and biodegradation, and add proprietary fluid-fluid and rock-fluid reactions and PVT calculators using the free, multi-platform plug-in software development kit.

• Sources and seals – Use any basin mesh as a “base case” and create multiple source and seal scenarios as input to migration, without re-running the original basin model. This can literally save days of project time.

• Multi-threading – Designed to take advantage of multi-core processors.

The software also includes post-processing tools for analyzing basin and reservoir simulation results. Create time-based views, data extracts, plots, cross-plots and many more, quickly and easily.
Basin Pressure/Temperature modeling

Forward-model pressures and temperatures in an evolving mesh using BasinPT, Permedia software’s basin pressure and temperature solver. Coupling a flexible calculator that uses the latest mathematics and computational efficiencies with rapid model building workflows, BasinPT allows users to model basin geometries and lithologies through time to create sophisticated 2D and 3D basin models quickly and easily.

Features include:

• lithology proportion maps and volumes

• flexible pressure and temperature boundary conditions

• interactive model building

• calculator plug-ins and flexible rock property tools

• full lithosphere model

• multi- and single-pass geometry fitting models

BasinPT supports models built using external packages (e.g., DecisionSpace®, Petrel®, and GOCAD applications).
Prospector and map-based tools

The software includes sophisticated, map-based tools for conducting fetch-closure, trap volume and fill-spill analysis. Each of these tools is “fluid-aware,” going beyond other geometry-based tools.

Build complex earth models interactively with Prospector. Features include:

• Fast model building – Build 3D earth models from a stack of maps using Prospector, Permedia software’s model-building environment. Models are created by assigning depth maps as structure maps in the model, each of which represents a layer top, and editing each layer’s model properties (e.g., age and lithology). Export the model as a mesh sequence, or use BasinPT to turn it into a full basin model.

• Simple object management – Data objects can be loaded or dragged and dropped into Prospector. Prospector is designed to work with earth models and handles curves, lithology libraries, paleotopography maps, structure maps, wells, cross sections and other objects in their own categories. Save modeling sessions to a single file for sharing and archiving.

• Instant 1D/2D models – Simply pick a point in the model to create a 1D basin model. Paleotopography curves are auto-generated from the input maps, and unconformities and rock property information is properly passed through. To create a 1D basin model for a specific well, drag-and-drop the well onto the earth model, then open the well from Prospector; all the pertinent model information is passed through for that well.

Perform quick prospect ranking on horizons using fetch-closure and fill-spill analysis.
SEE DATA IN CONTEXT

Permedia Petroleum Systems software includes a complete set of analysis and visualization tools, including a full OpenGL-accelerated 3D visualization environment, a suite of mapping analysis tools, a Well Viewer for analyzing well data, as well as powerful reporting tools for querying and analyzing data. Co-render and analyze data from multiple packages to get a whole new perspective on the complex plumbing of petroleum systems.

DATA SUPPORT

Use Permedia software seamlessly with a user’s existing tools. Now compatible with Landmark’s OpenWorks® database, the software reads files created by virtually every major package, including Temis, PetroMod, Eclipse, Irap™, TrapTester, and GOCAD applications, as well as industry-standard seismic, map, and well files:

- Basin modeling tools support PetroMod and Temis 2D/3D meshes
- Add faults using data derived from Badley’s TrapTester, or GOCAD surfaces
- Geostatistical data - reads GSLib volumes
- Seismic surveys – supports SEGY data from a variety of sources, and reads VoxelGeo volumes
- Cultural data – co-render cultural data from Landmark’s Z-Map Plus™, GOCAD, Irap, and Temis applications
- Well data – reads all industry-standard well formats (Irap ASCII well file, GOCAD wells, LAS well file), supports well markers and zones, and writes to GOCAD well format
- Mapping – reads all industry-standard mapping formats (Beicip, Z-MAP 2D Regular Grids, Generic 2D Regular Grid, Irap Grids, Grass 2DRaster Map, CPS-3 2D Regular Grid), and writes to Z-Map Plus, Beicip and Irap formats
- Native GOCAD support – provides native support for most standard GOCAD objects
- Migration simulation results can be output to several volume and map formats, including Z-Map Plus and GOCAD formats
System and Software

**OPERATING SYSTEMS**

*Red Hat® Enterprise Linux® 4/5, 64 bit*

*Windows® XP/Vista/7, 64 bit*

Co-render dozens of file types in 3D Viewer.
“Landmark’s Permedia application uses truly advanced algorithms to deliver high-resolution basin modeling. In my opinion, its hydrocarbon migration workflow is the best in the industry.”

BASIN MODELING SPECIALIST, INDEPENDENT OIL COMPANY

Landmark offers solutions to help you deliver on your business strategies. For questions or to contact your Landmark representative, visit us at landmarksoftware.com.