

Investigating Multi-surface Environments for Oil and Gas Exploration

By Teddy Seyed, Chris Burns and Abraam Mikhail

Skyhunter is a Calgary based oil exploration firm that has developed an innovative new technique for finding oil and gas reservoirs. Using a low flying aircraft and specialized detection equipment, Skyhunter's technology is able to capture microseeps.

Microseeps are trace amounts of hydrocarbons that have escaped from oil and gas reservoirs and reached the surface. Flying close to the ground and in a tight grid, Skyhunter gathers data for an entire surveyed area. This data is processed and interpolated to produce a microseep map, which indicates where the potential for finding oil and gas is highest.

Currently this information is then visualized using a paper based approach that is expensive, costly and not scalable. The ASE Lab in collaboration with the Scalable Reservoir Visualization Group, is working to modernize this visualization and combine it with other forms of data that will be helpful to geologists, geophysicists and other professionals.

Our current approach in visualizing SkyHunter's data replaces the paper



based maps with multi-touch tabletops. This allows a user to pan and zoom through the microseep data and make choices about what types of data to visualize. In addition, we employ a consumer tablet to visualize seismic data in a manner such that the vertical orientation of the data is preserved. When a user places the tablet down on

the table, the appropriate seismic cross-slice information that corresponds to the area where the tablet was placed is displayed.

In the future, we plan to create a more complete multi-surface environment, including utilizing the Microsoft Kinect to create an innovative visualization environment.

In This Issue

- Investigating Multi-surface Environments for Oil and Gas Exploration
- Agile Software Design Exploration with Aspect-Oriented Models
- Research In Review: New Special Projects

For SurfNet contact information go to:

<http://www.nsercsurfnet.ca/pmwiki.php?n=SurfNet.Contact>

Agile Software Design Exploration with Aspect-Oriented Models

By Jörg Kienzle and Omar Alam

Software design is a creative activity. Like designers in other fields, software designers discuss design alternatives with their advantages and disadvantages among team members and explore different ways of achieving desired system functionality. To assist the designers in their work, we propose a modeling tool that allows to design a system at a higher level of abstraction than source code. As a result, the tool can convey essential information about the structural and behavioural properties of a specific design in a concise way.

Unfortunately, design models of real-world software systems tend to be of substantial size, and building them using a mouse-based interface and conventional modeling techniques requires considerable time. Attempting to modify existing models in such tools to experiment with different design alternatives is even more tiresome. Therefore, in this project, we are exploiting the advanced modularization capabilities of aspect-oriented modeling (AOM) combined with an intuitive multi-touch user interface to build a software design tool that makes agile software design exploration possible.

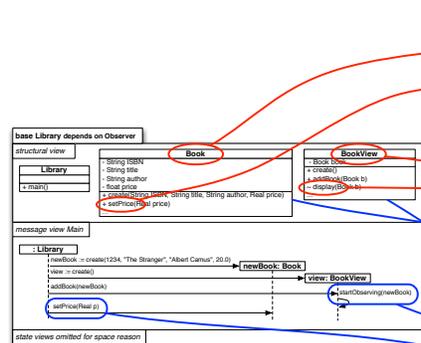


Figure 2: Partial Design Model of a Library System

Using AOM, a developer can describe the design of software using many aspect models. Each individual aspect model is small in size and focuses on one particular design concern. An example of a simple aspect model is shown in Figure 1. We plan to build an extensive aspect model library of commonly occurring designs concerns (e.g. design patterns, support for concurrency and distribution, database and framework integration).

To build larger systems, aspect models are composed with each other. Using gestures on the touch screen, a developer specifies mappings between model elements (classes, methods, attributes, and states) as shown in red in Figure 2. Our tool then uses a model weaver to combine the selected models and (shown in blue in Figure 3). The weaver

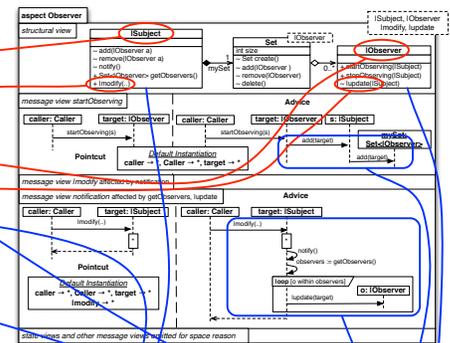


Figure 1: Aspect Model of the Observer Design Pattern

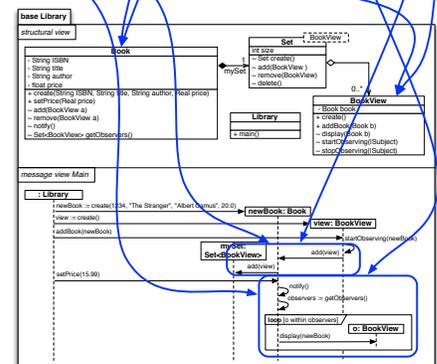


Figure 3: Design Model of the Library After Weaving of the Observer Design Pattern

is efficient enough to present the developer with immediate feedback on the consequences of applying a particular design solution to his models. Applying an alternative solution is as simple as specifying a new mapping and running the weaver again.

Research In Review

On February 22nd, the SurfNet Advisory Board chose the following five projects for Special Project Funding. Thank you to all students who submitted project proposals.

- **Victor Cheung, University of Waterloo**
“Exploring Extremely Usable Interfaces for Interactive Surfaces”
- **Aaron Genest, University of Saskatchewan**
“Characterizing and Representing Gesture Height Over Digital Surfaces”
- **Sean Lynch, University of Calgary and Gerry Straathoff, Alberta College of Art and Design**
“Attention and Comprehension in Very Large Screen Displays”
- **Shaun Phillips, University of Calgary**
“PULSE: Visual Decision Support for Release Management”
- **Xing-Dong Yang, University of Manitoba**
“Tangibles for 3D Interaction on Tabletop Surfaces”