

# TREETIPS

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## ADABAS-to-RDBMS Real World Series

(Part One of Several) By Joseph Brady and Dan Sycalik

This is the first in a series of articles documenting Treehouse Software's ADABAS-to-RDBMS solution implemented in several different "real world" environments.

The data migration/propagation product offerings from Treehouse Software, Inc. (TSI) include **tRelational** and **Data Propagation System (DPS)**, THE solution for migrating legacy ADABAS data into RDBMS-based Internet/Intranet/ERP/Data Warehouse applications.

**tRelational** auto-generates complete RDBMS schema from existing ADABAS files and, alternatively, allows easy mapping

of ADABAS fields to pre-existing data warehouse or ERP schemata. After **tRelational** does the mapping, **DPS** can then materialize (initially load) and propagate (subsequently keep synchronized) the ADABAS data into the RDBMS without requiring direct access to ADABAS.

After looking at several options, **Brian Johnson**, Database Administrator at Cutler-Hammer, recommended replacing their existing in-house developed solution with **tRelational** and **DPS** for "data processing efficiency". Due to resource

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### ADABAS-to-RDBMS Solution Web Site

[www.treehouse.com/tredpsinteractive.html](http://www.treehouse.com/tredpsinteractive.html)

Visit the **tRelational** and **DPS** interactive section of the TSI Web site devoted to our ADABAS-to-RDBMS solution. Flash

demonstrations of ADABAS File Implementation, ADABAS Data Analysis, Auto Generation of Normalized Tables for an ADABAS File, Output Generation, **DPS** Materialization, **DPS** Propagation, and much more can be viewed.

Ty	Repeating Field Name	F	Len	Records w/Any	Records w/Mult	Max	Avg
MU	AI ADDRESS-LINE	A	20.0	1149	1144	4	3.94
PE	IQ INCOME	A	11.0	1149	1144	5	4.97
MU	LEAVE-BOOKED	P	9.0	1149	1144	3	2.95
PE	IV LEAVE-BOOKED	A	11.0	1149	1144	4	3.95
MU	AZ LANG	A	3.0	1149	984	3	2.31



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# Editor's Sproutings by Joseph Brady

## New Faces at TSI

TSI extends a warm welcome to the following new staff members:

**Orion Wolff** has been hired as a Sales representative. Ori is working at our Sewickley office.

**Larry Jones** has joined TSI in a full time consulting capacity. Larry is assisting TSI in bold, new efforts in the **tRelational/DPS** area.

**Wayne Lashley** has joined TSI as Sales and Technical Representative. Wayne is making lots of visits, presentations, and performing installs, demos, and consulting.

**Richard Mellick** has joined the TSI technical staff. Richard's primary focus is **tRelational/DPS** development.

**Bozena Skrzypek** recently joined TSI as a Sales and Technical Representative. Bozena resides in Canada, where she will be visiting customer sites to give presentations, demos, and provide consulting services.

## TREETIPS

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## European Direct Sales and Support by Hans-Peter Will and Joseph Brady

In addition to TSI's network of affiliates, **Hans-Peter Will** of Germany serves as TSI's European Technical Support Specialist. In this capacity, he is responsible for handling direct technical support and sales of TSI products throughout Europe. The personal touch, having Hans-Peter taking care of the customer and distributing products, has proven to be successful. During the past year, Hans-Peter has found new customers, and existing customers have requested additional TSI software. For example, DGZ · DekaBank, a share funds and unit trust funds bank, is now using **TRIM**. Also, Kommunaler Versorgungsverband Baden-Württemberg, a company providing retirement pensions, civil servant pensions, etc. chose to use **TRIM** for their ADABAS performance needs.

Much excitement is being generated throughout Europe for TSI's data mapping and migration tools, **tRelational** and **DPS**. A partnership centered on these products was created with Oracle Germany and their Migration Group. Together, our companies have presented solutions for migrating data from ADABAS to ORACLE and building data warehouses between these databases. The folks at Oracle think that **tRelational** and **DPS** exactly fit their needs in this area.

During the Summer of 2000, Hans-Peter, **George Szakach**, and **Dan Vimont** traveled to Frankfurt and Budapest to attend Oracle migration meetings, where they met with Oracle representatives from Germany, Ireland, USA, and Hungary. More recently, TSI was a key speaker at a special Migration Event held in the Oracle Germany head office. About 37 participants from 15 different public service companies were present to learn how they can migrate their data to ORACLE without any additional individual software development.

Oracle has included the **tRelational/DPS** Interactive section of the TSI Web site (see page 4) on a CD that is distributed to prospects and customers who attend their events in Europe. We look forward to expanding this partnership and participating with Oracle in other events.

CCA Software sees the advantage in having a technical support person in close proximity to the customers. In addition to North American representation, TSI is now involved with CCA and their products **ADAREORG**, **ADASTRIP**, **QDUMP**, and **DBAUDIT** in Europe. A large, independent, specialized bank, which operates internationally, recently chose **ADAREORG** to restructure and reorganize their ADABAS files. We are confident that business will grow in this area also.

If 2000 was an indication of European interest in TSI products and services, we are looking forward to spectacular growth in 2001.

## Demo TSI Products On-line

Contact [sales@treehouse.com](mailto:sales@treehouse.com) to set up a live, on-line demonstration of any TSI product. All you need is an Internet connection and a current Web browser (Netscape, Internet Explorer, etc.) to see TSI products in action on your PC screen.

## Find out the Latest on TSI Products

To find out about current versions of TSI products, compatibility (operating systems, languages, etc.), and support information for all of our products, view the TSI Product Status Matrix on-line at [www.treehouse.com/prodstatus.html](http://www.treehouse.com/prodstatus.html).

## ADABAS-to-RDBMS Real World Series (continued from page 1)

availability and timing considerations, Cutler-Hammer contracted Treehouse consulting services to perform the project tasks to create the **tRelational** Model(s) and perform the **DPS** implementation.

The following is a discussion between Brian, **Dan Sycalik**, Treehouse Project Manager, and **Joe Brady**, Treehouse Manager of Documentation, Web Site, and Marketing Materials.

### Brian, can you tell us a little about Cutler-Hammer?

Cutler-Hammer, a division of Eaton Corporation, is one of the world's leading suppliers of electrical control products and power distribution equipment, with sales of approximately \$2 billion in the year 2000. We have approximately 59,000 employees and 195 manufacturing sites in 24 countries.

Cutler-Hammer sells a complete line of low and medium voltage assemblies from substations, switchgear, and panelboards to load centers, transformers, and safety switches. These products are used wherever there is a demand for electrical power in residences, high-rise apartment and office buildings, commercial sites, hospitals, and factories. Every person reading this article will probably somehow be affected by Cutler-Hammer products each day, every time you turn on a light, plug in your computer, etc.

### What kind of application is this, and who are the key players at Cutler-Hammer for this project?

Vista, as we call our ADABAS/NATURAL applications, is a mission-critical system supporting core functions, such as order entry, order management, shipping, and invoicing, and has performed this role for all of Cutler-Hammer since 1991. There are over 260 ADABAS files, the largest containing 40 million records, with approximately 10 thousand NATURAL objects. This mission-critical application processes over 10 thousand batch jobs per day, and we usually see a peak of about 1300 users per day.

Much of the transactional data generated by Vista needs to be analyzed in order to obtain enough business information to make accurate predictions and correct decisions. With the availability of some best-of-breed warehouse and business intelligence (BI) query tools for use against ORACLE, ORACLE became the platform of choice for Mentor and Genesis, our data warehousing projects.

In support of the warehousing effort, I handle the ADABAS

issues, **Ketan Shah** is our Oracle DBA, and **Gus Delorme** drives the requirements as Decision Support Manager. As is the nature of warehousing efforts, Gus' requirements for the scope of the Data Warehouse projects increased over time, which in turn increased the volume of data propagation from Vista to the warehouse. This exposed the limits of the current process, and it was becoming a maintenance nightmare.

### What was the existing data migration process?

We extracted After Images from the PLOG (via PLEU) and then massaged the extracts with NATURAL programs into fixed length format (uncompressed). SAS read the flat files and loaded them to ORACLE tables. This was from OS/390 to UNIX.

### What were the motives for replacement?

More and more data was being requested, and the propagation processes were taking increasingly longer amounts of time to accomplish. Again, maintenance was becoming more difficult to perform and coordinate.

### Did you look at other solutions?

We carefully reviewed other product offerings and found that **tRelational** and **DPS** were the only products available that could handle the entire ADABAS-to-RDBMS process end-to-end. Most products only offered a piece or two of the solution.

### What features made tRelational and DPS the products of choice?

**tRelational** and **DPS** were the most mature solution, having been built to be as efficient as possible. This

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*"We're impressed. Starting in mid-September, we required Treehouse to develop a 30-day error-free parallel process by the end of the year. They completed the job with plenty of time to spare.*

*Our experts tell me the products and consulting services Treehouse provided really bailed us out from a very programmatic Data Warehouse solution. They say the new product solution is much easier to maintain and will enable us to significantly expand on the Warehouse.*

*Additionally, I'm happy to hear that there will be a significant cost savings over time."*

### Randy Carson

Chief Executive Officer, Cutler-Hammer

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## ADABAS-to-RDBMS Real World Series (continued from page 3)

efficiency could be seen in the PLOG extraction, which reads the PLOG directly in compressed form; data transformation, which uses efficient assembler routines (many are supplied with the product); simplified maintenance with the modeling tool that reads FDTs & DDMs and generates DDLs and **DPS** parms; and scalability for future requirements of the Data Warehouse.

Other important features were that the Treehouse solution had absolutely no effect on ADABAS, and allowed for options to tune (i.e., Duplicate Change Scan, Materialization Output, etc.).

### What roles did Treehouse consulting play in the project?

Treehouse provided a key role on the planning/management of the project because they brought experience from past projects for data warehousing/migration. Because of this experience, they were able to recommend several improvements to the process.

Treehouse consultants also delivered the needed technical skills in ADABAS, ORACLE, and UNIX for project completion. And in the end, the folks at Treehouse met the given time and deliverable objectives (or we wouldn't have paid them).

### Did tRelational and DPS deliver process efficiency improvements?

The **DPS** process was implemented as a parallel process, so we were able to ensure that we were doing the same

job. Overall, **DPS** ran in 40% of the time that our SAS process took.

### Did tRelational and DPS provide added functionality, flexibility, and maintainability?

Maintenance was easy. All we needed to do was re-implement a file (a menu option in **tRelational**), and in about one minute I could re-run a batch job to generate **DPS** parms. Voila!

### Did implementation meet your acceptance criteria (30-day parallel)?

Yeah, we paid Treehouse (laughs).

### How does this affect your ADABAS system?

The Treehouse ADABAS-to-RDBMS solution actually entrenches Software AG products at Cutler-Hammer by eliminating the pressure to migrate off of ADABAS/NATURAL, since we now can easily get ADABAS data to ORACLE using these TSI products. If it wasn't made easy, we'd look at moving to a homogeneous environment (i.e., all ORACLE).

### How does this affect your current ORACLE system?

**tRelational** and **DPS** allow us to expand utilization of data warehouse, datamart, and distributed applications that require data from the ADABAS source.

### Are there plans to migrate more data to ORACLE?

You have no idea!

## Project Overview

Cutler-Hammer required modeling and mapping of 37 source ADABAS files from 4 production databases to 53 target tables. They did not require an initial Materialization of the ORACLE tables and requested a non-typical implementation of **DPS** Propagation. Cutler-Hammer required a full table row image (i.e., Materialization output) result from Propagation processing, as opposed to typical SQL Inserts, Updates, and Deletes.

### Project Highlights

TSI met with Cutler-Hammer during the initial project scope and contract agreements and for a single project status meeting, but conducted the consulting services remotely.

### tRelational Modeling and Mapping Review

Cutler-Hammer had an existing ORACLE Schema to reproduce in **tRelational**. TSI utilized the **tRelationalPC** (continued on page 6)

The screenshot shows the tRelationalPC interface. On the left, a tree view displays the 'DEMO-EMPLOYEES' schema with fields like PERSONNEL-ID, BIRTH, HIRE-DATE, NAME, FIRST-NAME, CITY, POST-CODE, COUNTRY, PHONE, LAST\_UPDATED, and REVISION\_NUM. On the right, a diagram maps these fields to ORACLE tables: 'EMPLOYEES' (PERSONNEL\_ID, BIRTH, HIRE\_DATE, NAME, FIRST\_NAME, CITY, POST\_CODE, COUNTRY, PHONE, NOTES, LAST\_UPDATED, REVISION\_NUM), 'LANS' (PERSONNEL\_ID, DPS\_MU\_SEQ, LANG), 'ADDRESS-LINE' (PERSONNEL\_ID, DPS\_MU\_SEQ, ADDRESS\_LINE), 'INCOME' (PERSONNEL\_ID, DPS\_PE\_SEQ, CURR\_CODE, SALARY), and 'BONUS' (PERSONNEL\_ID, DPS\_PE\_SEQ, DPS\_MU\_SEQ, BONUS). A 'TREETIP' callout box is overlaid on the bottom right of the screenshot.

### TREETIP

(using the DEMO-EMPLOYEES sample ADABAS file shown here)

**tRelational** provides the unique ADABAS field to RDBMS mapping. An Imported schema (**tRelationalPC** ERWIN or ODBC Import) contains the physical model (e.g., tables, columns, and constraints). To establish a mapping: click on the target column, drag the column to the Implemented file area, and drop the column on the desired source ADABAS field to establish the mapping.



# How Much More Can One Product Set Do?

by Dan Vimont, Dan Sycalik, and Joseph Brady

Recently, TSI shipped out the first formal documentation and sample code for use with the **tRelational** read-only API (Application Program Interface), which provides yet another option for the adhoc reporting needs of our client-base. Beta documentation was sent to a state government customer who wants to generate their own Teradata DDLs (Data Definition Language) based upon Data Model metadata in **tRelational**.

The process consists of distributing a set of local data areas that give a site the layout of the parameters with which to call the API subprograms. Additionally, a set of "sample programs", which demonstrate the use of the API subprograms (and annotated with appropriate comments), are included.

There are some choices, sort of...

Days, weeks, or months may be spent talking about possible options available for the sharing of mapping/modeling metadata between **tRelational** and various client tools. However, as one peruses the options available on the market for ETL (Extract, Transformation, Load) and CDC (Change Data Capture) from ADABAS to RDBMSs, basically two distinct groups will be found:

1. An integrated product-suite that offers highly-automated metadata management and full ETL and CDC functionality (there is only one — **tRelational/DPS**).
2. Middleware products that offer a means to directly access ADABAS data but do not address metadata management issues in any way and force each site to spend a few years constructing their own home-grown ETL and CDC solutions "around" the middleware.

And the list grows...

To summarize, we now have the following ways to get RDBMS metadata into and out of **tRelational**:

1. A "public" (read-only) API to access all metadata (ADABAS file structure, RDBMS data-model, and ADABAS-to-RDBMS mapping information) in **tRelational**'s dictionary.
2. A "private" (read/write) API, which can be made available to partners. (This is, in fact, the API used by our GUI front-end to **tRelational**: **tRelationalPC**.)
3. Full "exportation" of all contents of the **tRelational** dictionary into tables in any of our supported RDBMSs, which obviates the need for your programmers to learn about and access our API — all they have to do is query the ORACLE tables!
4. Full "exportation/importation" of all metadata objects stored in the **tRelational** dictionary through fixed-format flat files (called the "TRELOAD" and "TREUNLD" functions).
5. Implicit "exportation" of RDBMS data model documentation in the form of DDLs, complete with table-level and column-level comments derived from their corresponding ADABAS structures.

As you can see, all of these options put TSI years ahead of any would-be competitors out there. Keep checking TSI's Web site for the latest developments.

## Still Typing Existing RDBMS Schema Elements by Hand?

The new "ODBC (Open Database Connectivity) Import" feature makes it even easier for a site to import existing RDBMS schema into **tRelationalPC V4.0**. There is no need to type in all of those Tables, Columns, and Constraints by hand. A simple drag and drop procedure is all that is required for the creation of ADABAS-to-RDBMS mappings.

The data is input using an ODBC API (Application Program Interface). These components would have been previously defined by an RDBMS with an ODBC driver. An appropriate Data Source must be defined on the working PC as well. On some PCs this is accomplished by the following path: Start Menu/Settings/Control Panel/32-bit ODBC/System DSN. The documentation specific to your PC should contain this information.

The components can then be used to create a new Data Model or merged into an existing Data Model. In addition, the target RDBMS specified must be one that is supported by **tRelationalPC**.

The mapping of Columns to ADABAS fields is not automatically done through the import feature. The initial conversion must include the two-step process of associating the columns and ADABAS fields:

1. Edit each Table's properties to select an ADABAS file from which the ADABAS fields will be mapped.
2. Create ADABAS mappings for each Column within the Table.

If a Data Model has already been successfully mapped and saved to the server, the import feature can merge these mappings with the schema being converted. The Table name/Column name combination is used to identify existing mappings on the saved Data Model. These name lookups are done with the exact Table and Column names.

Any Tables or Columns new to the data model will need to have the ADABAS field mappings added.

## ADABAS-to-RDBMS Real World Series (continued from page 4)

V4.0.0 ODBC Import option to load the existing ORACLE schema (tables) into the **tRelational** repository. **tRelationalPC**'s enhanced click, drag, and drop functionality enabled quick and easy ADABAS field to RDBMS column mappings. TSI created four models, one model for each unique Database ID (DBID), containing 3, 4, 12, and 34 tables. TSI created the batch jobs to generate the ORACLE DDL and the **DPS** Parameters.

### DPS Implementation

TSI implemented a **DPS** Propagation Extract and Materialization Transformation (achieved by executing `PARAMETER='PROPAGATION EXTRACT, MATERIALIZATION TRANS'`). The Materialization Transformation output file must be processed with the DPSSPLIT Utility program producing individual data files.

#### TREETIP

DPSSPLIT is a utility provided to split the **DPS** Materialization Control and Data files for SQL Utility Load processing. DPSSPLIT may be executed on the Mainframe or the target RDBMS platform (e.g., UNIX or NT).

### Mainframe to UNIX (End-to-End) Processing

Cutler-Hammer was concerned with the mainframe FTP processing and the end-to-end Mainframe to UNIX scheduling. TSI provided a newly developed **DPS** Service Utility (DSU).

The purpose of DSU is to provide an additional means to verify the reliability of file transfers between the mainframe and a UNIX system. There are two pieces to DSU: a client portion residing on the mainframe and the server portion residing as a daemon on the UNIX system. The function of the utility is

to compare record counts of files residing on the mainframe and UNIX system and report any differences found. DSU executes a completion script or an error script based on the match or mismatch of results.

TSI implemented a mainframe DPSSPLIT and an FTP and DSU step for each of the split files. Upon successful verification, DSU executes a shell script to perform the UNIX load processing. The Propagation result rows are loaded to temporary "staging" tables and subsequently processed with ORACLE PL/SQL scripts to Update or Insert rows into the production report repository.

#### TREETIP

DSU was utilized to verify a successful end-to-end processing (mainframe to UNIX "handshake"). The first step of a **DPS** Propagation Mainframe job executed DSU to verify the existence of a "done" file on the UNIX platform. If the "done" file was not found, the job was terminated with a non-zero return code. If the "done" file was found, it was deleted and the jobstream executed. The last step of the job created a new "done" file. This assured that the previous **DPS** Propagation process was complete.

Note: Cutler-Hammer requested all Deletes to be ignored. These requirements were satisfied with additional processing scripts.

### Project Summary

TSI successfully implemented a fully-operational system in a test environment to conduct a 30-day parallel validation and acceptance testing. TSI modeled the implementation from the existing production ADABAS-to-RDBMS data warehouse and the processes setup during the initial product trial and review of **tRelational** and **DPS**.

TSI expanded on the existing procedures and scripts to provide for a more flexible and maintainable implementation. Log files, error trapping, and the ensured end-to-end execution satisfied the client's objectives and accomplished their desired results.

## Upcoming Articles on Other Satisfied tRelational and DPS Customers

### Miami University of Ohio (MUO)

MUO was departing from the Mainframe and purchased a third-party vendor package to replace an existing ADABAS/NATURAL application environment. MUO distributed an RFP for service to migrate the

ADABAS data to a UNIX/ORACLE platform. Treehouse provided a response including the product solution **tRelational** and **DPS** and was awarded the contract.

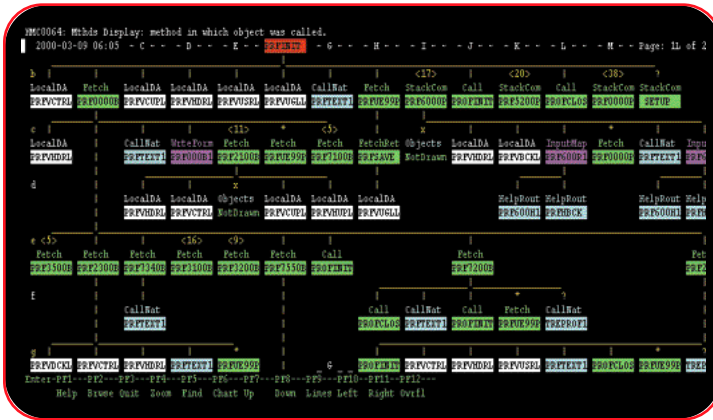
### First American Real Estate Solutions (FARES)

FARES had a large, high profile project to populate an ORACLE report repository from a core

ADABAS/NATURAL application. A consulting firm was awarded a contract to design, develop, and implement the ORACLE application. The firm investigated all options for keeping the RDBMS in sync with the ADABAS OLTP activity. Treehouse presented the **tRelational** and **DPS** product solution, conducted a three-day Pilot demonstration, and the product solution was purchased.

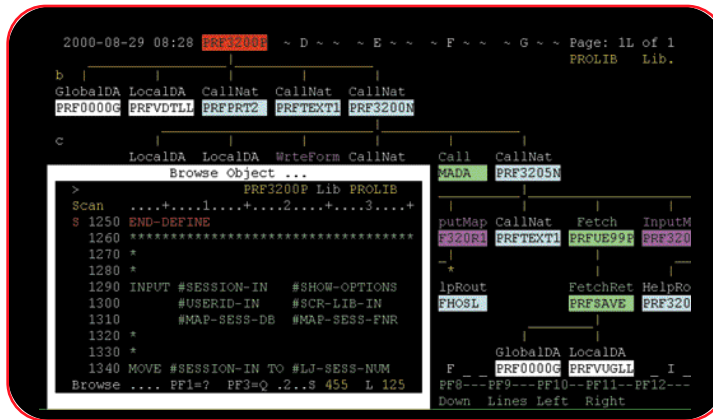
Plus many more! Interest in **tRelational** and **DPS** is increasing worldwide. We'll be publishing customer case studies and interviews as fast as we can get them.

## Does Your NATURAL Application Look Like This?



## If You Can't Tell, CHART Can.

**CHART for NATURAL** assists with the analysis and documentation of NATURAL applications. **CHART** draws the object-to-object calling structure of any NATURAL application in an easy-to-read, graphical format. **CHART** can be used on-line or in batch and gives fast accurate results. **CHART** is a well-rounded and friendly tool for analysts and programmers.



As seen in the example above, PRF3200P has been selected from the calling structure. The PRF3200P object is now expanded and can be browsed by the user.

**CHART** reads the source code of your application (across your normal step libraries), builds an object-to-object calling structure, and presents the results. From this point, you can browse any object without leaving the chart, or the chart can be re-drawn using different criteria.

**CHART** itself is written in NATURAL and runs directly on the mainframe.

**Download a CHART Trial Today!**

You can begin CHART-ing your NATURAL applications today by downloading a **CHART trial** from the Treehouse Web site at <http://www.treehouse.com/proddownload.asp>.

## On-site Training Tips by Joseph Brady

TSI representatives are available to visit customer sites to conduct training sessions for our products. Before a visit we like to find out as much as we can about the site, such as the size of the department, hardware configuration, etc. However, what is difficult to ascertain until we are on-site is how knowledgeable the class members will be on the products or their environment. Due to countless factors within an organization, team members may have limited access to information that could help them understand the "global picture" of their IT environment.

To help make on-site training as successful as possible, TSI encourages organizations to assemble a class group that can represent all areas of the environment in which TSI products will run. This can be of great benefit to TSI and class members, especially regarding support issues and knowledge of management /decision making structures.

A recent example of a well organized effort was when **Lynn McIntyre**, TSI's **N2O** Product Manager, visited a customer site to conduct an **N2O** training class. The group at this particular site (a large university) impressed Lynn with how well they knew their existing setup and how they could make decisions about an application life cycle during the class.

Lynn also commented that a couple of members of the group were involved in testing various **N2O** batch submit processes to determine what would work best for them. They even wrote a nice addition to the standard **N2O**ERJE (batch submit) Exit, which opens a window that asks for a user-ID and password for submission. This information is then entered into the batch job.

Most of the training was completed by the end of the third day, and the fourth day was spent doing hands-on scenario testing. During this time, several of the attendees put **N2O** through "real world" situations, and **N2O** passed with flying colors.

The final day was spent answering questions, such as what time of day should the production environment be updated?; when should file updates be done?; who is responsible for the tasks?; and what documented process should be in place? It is not unusual for many sites to be just beginning to understand their individual application life cycle in the fifth day.

As Lynn put it, "These guys know their stuff!" For more information on product training classes, contact TSI.

# TREEHIPS



Treehouse Software products include:

**Relational Products:**

tRelational - ADABAS data analysis, relational modeling, and mapping tool; **DPS** parameter generator

tRelationalPC - Windows-based graphical interface to make the tasks of modeling and mapping even simpler.

Treehouse Remote Access (TRA) - Middleware that allows **tRelationalPC** to communicate with **tRelational** on the mainframe.

DPS - ADABAS to RDBMS data materialization, replication, and propagation software

**UNIX Products:**

SEDIT - XEDIT and ISPF/PDF compatible editor for UNIX and Windows

S/REXX - REXX-compatible language for UNIX and Windows

S/REXX Debugger - Optional graphical debugger for **S/REXX** programs

**Software AG Related Products:**

ADAREORG - File reorganization tool for ADABAS

ADASTRIP - Data extraction utility for ADABAS

\* AUDITRE - Generalized ADABAS auditing facility

\* AUTOLOADER - ADABAS file automatic unload/reload/dump utility

\* CHART for NATURAL - NATURAL application analysis and documentation tool

DBAUDIT - Data integrity verification utility for ADABAS

\* N2O - NATURAL application change management system

\* N2O/3GL - 3GL support within **N2O** for PANVALET, LIBRARIAN, ENDEVOR, and PDSs

PEEK - ADABAS file browsing utility

\* PROFILER for NATURAL - NATURAL quality assurance and testing tool

QDUMP - Incremental backup utility for ADABAS

RACE - NATURAL performance enhancer and "Redundant ADABAS Call Eliminator"

\* SECURITRE - ADABAS and NATURAL security interface to RACF, ACF2, and TOP SECRET

\* TRIM - ADABAS and NATURAL performance monitor

\* Indicates TSI Products that are marketed for TSI by international affiliates

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