ADABAS-to-RDBMS *Real World* Series

(Part Three of Several)

Treehouse Software can guide you out of the stormy waters of ADABAS data migration.

This is the third installment in a continuing series of articles featuring **tRelational** and **Data Propagation System (DPS)**, TSI's ADABAS-to-RDBMS product implementation, in several "real world" environments.

tRelational can auto-generate complete RDBMS schema from existing ADABAS files and allows for easy mapping of ADABAS fields to already existing data warehouse or ERP schema. 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.

Service Nova Scotia & Municipal Relations (SNSMR) is a relatively new Provincial Government department created from the amalgamation of the former departments of Business & Consumer Services and Housing & Municipal Affairs. The Department is using technology to deliver a wide range of government services across the province. The ultimate goal is to deliver the services people need, when, where, and how they need them, not simply during regular office hours.

What is Service Nova Scotia & Municipal Relations?

In a nutshell, the new department's businesses fall into five categories:

- Registry and Information Management, where businesses can register a name, apply for licences, and enroll in government programs

- Alternate Program Delivery, which investigates new ways of serving clients through innovative partnerships

- Service Delivery and Operations, which manages the day-to-day frontline and electronic operations, such as the Access Centres, Registry offices, and Service Nova Scotia Express kiosks

- Program Management and Corporate Services, which develops policies and programs in consultation with key stakeholders

- Municipal Relations, which deals with Nova Scotia's 55 municipal administrations

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TSI

Treehouse Software, Inc.

Inside This Issue

Editor's Sproutings by Joseph Brady

TSI Traveling Tales

Over the past few months, TSI representatives have visited sites in Canada, Germany, California, Florida, Georgia, Massachusetts, North Carolina, Texas, Utah, and Washington State.

TSI will have a booth at the Technology in Government Week 2001 Event, October 15 - 18, 2001 in Ottawa, Canada. **Wayne Richard** from Service Nova Scotia & Municipal Relations will be on hand at our booth to discuss using **tRelational** and **DPS** for their data migration project.

TSI representatives will be giving presentations of **tRelational** and **DPS** at the 10th Natural Conference on October 28 - 31, 2001 in Boston.

TSI Welcomes Two New Members of the Management Team

Steve Lippock, Vice President of Sales

As Vice President of Sales, Steve is responsible for channel sales and direct sales of Treehouse products and services. Steve is excited about TSI's potential for sales of its data migration product suite. He brings 17 years of direct sales experience in three different industries and 10 years of experience in sales management to TSI. Steve graduated from University of Pittsburgh in 1985 with a B.S. in Economics. He has provided instruction to entrepreneurs on building and motivating sales teams for the University of Pittsburgh's School for Entrepreneurial Excellence.

Michael Ripple, Vice President of Business Development

As Vice President of Business Development, Mike focuses on strategic marketing and on the selection and acquisition of key channel partner relationships. Mike will be working with potential partners for maximum exposure and sales of TSI's data migration products. He has over 20 years of experience in high technology companies. Prior to joining TSI, Mike was Vice President of a Web application company that provides sell-side business-to-business software to Fortune 500 manufacturers. Mike started his career as an Engineer and holds an MBA from Drexel University and a BSEE from Bucknell University.

TSI Visits Brazil by Steve Lippock

Due to the strong demand for TSI products in Brazil, TSI's Brazilian affiliate, 3CON has scheduled a three city tour of Brazil for the beginning of October. TSI will be supporting **Genivaldo Araujo** and the 3CON team by sending two representatives to participate in the events. The tour will run from October 1st through 5th and will include three formal events in the cities of Rio de Janeiro, São Paulo and Brasília.

Attendees from TSI will be **Dan Sycalik**, TSI Project Manager, and **Steve Lippock**, VP of Sales. Dan will be presenting an overview of TSI products and will be performing a demo of tRelational/DPS. Steve will present the TSI company overview and review TSI's future direction and strategic initiatives. Other agenda items to be covered by the 3CON team include customer case studies, workshops, and additional product demonstrations. In addition, BMF, one of 3CON's customers, will jointly present the benefits of tRelational/DPS with 3CON. 3CON has recently been very successful marketing the tRelational and DPS products.

The TSI team is very excited about the opportunity to support 3CON's efforts to proactively market TSI products. We wish to thank Genivaldo and the entire 3CON team for investing the time and resources to make both of our companies successful in the Brazilian market.

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One group, the Compliance Unit, is responsible for enforcing regulation of the commercial trucking industry in Nova Scotia and ensuring adherence to road safety requirements.

The Compliance Unit works in conjunction with the Canadian Council of Motor Transport Administrators (CCMTA), which is the official organization in Canada for coordinating all matters dealing with the administration, regulation, and control of motor vehicle transportation and highway safety. CCMTA incorporates members from the Federal government and all Canadian Provincial and Territorial governments, as well as Associate Members from more than 370 transportation-related organizations.

Prior to this development project, the Compliance Unit used a number of disparate systems to collect Nova Scotia Carrier (NSC) information at the Head Office, weigh stations, and roadside. The Compliance Unit required a new integrated system to eliminate duplicate data entry, improve efficiencies, and meet Federal requirements for information sharing between provinces. The new system was designed to help the Compliance Unit improve processes and productivity relating to the collection, input, transmittal, retrieval, and use of carrier conviction, collision, Commercial Vehicle Safety Alliance (CVSA), and audit information.

The CCMTA-mandated information exchange was the prime business driver to initiate development of the Carrier Profile System. The Director of Compliance also viewed this as an opportunity to fulfill a long-standing vision of providing real-time information retrieval and entry capabilities to mobile in-car and regional Compliance Officers and Facility Auditor staff. Wireless Internet services via Cellular Digital Packet Data had recently been provisioned within the Province.

After the successful demonstration, and a collective sigh of relief, the project team was committed to using Treehouse.

Most of the pertinent data pertaining to drivers, vehicles, and carriers is collected and maintained in the main provincial Registry of Motor Vehicles (RMV) system, a mainframe NATURAL/ADABAS application that first went into production in 1987. The RMV system has numerous interfaces for data interchange with other systems, such as the Department of Justice (summary offense tickets and convictions under the Motor Vehicles Act), CCMTA (non-commercial driver and vehicle information), and the International Registration Program.

The main development criteria were to provide a Carrier Profile System that met the CCMTA data interchange mandate, provide a client-friendly data input and retrieval

capability over low bandwidth network connections, and provide ad hoc query and reporting capabilities to facilitate road safety activities and assess the effectiveness of road safety programs. These criteria pointed to a browser-based application interface with a relational database back end. The initial functional and technical design work completed under contract by a local consulting company had recommended such a solution but with a wholesale manual export of selected RMV data to an ORACLE back end and disengaging the RMV and Carrier Profile systems. Although technically "doable", this proposal was less than ideal, as there would now be two application interfaces to operate, RMV and CAPS, and duplicate data entry required for updates. In light of other development work in the Provincial Government dealing with alternative access channels to NATURAL/ADABAS applications, the Compliance Unit decided to proceed with a development contract but with an alternative architecture evaluation as the initial deliverable. EDS Canada was awarded the contract, and the Project Team began their work in October 2000.

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The design choices considered included:

- **Remain fully in the NATURAL/ADABAS environment by adding CAPS functionality to RMV and utilize a 3270 client front-end**

- **Develop the application as a browser interface using a middleware or message broker product front-end and have the data continue to reside in RMV ADABAS files**

- **Utilize the hybrid model proposed in the initial design exercise**

- **Deal with the CAPS system at the data level by migrating to ORACLE with synchronization from RMV, and develop the web front-end using common web programming techniques**

Although NATURAL/ADABAS applications, such as RMV, fulfill their transaction processing role well, the lack of experienced NATURAL/ADABAS programmers in this region presented a significant risk to continued new development. That approach was discounted fairly early in the decision process. The second choice, application integration using a middleware or message broker interface was thought to be both cost and performance prohibitive. RMV comprises some 3,000,000 lines of code in 1500 modules, and there was a concern that the granularity of program modularity would not easily lend itself to this type of EAI architecture.

The Lead Technical Architect for the Project Team found a company with the unlikely name of Treehouse Software with two products, **tRelational** and **DPS**, that were thought

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to provide a good fit for our requirements. RMV would remain as the principal vehicle, driver, and activity registration platform, as well as the interface to Justice for driver convictions, while CAPS would serve its intended function with regular updates propagated from RMV and CCMTA. The product literature was promising, and the WebEX meeting (live, on-line demo) confirmed that if **tRelational** and **DPS** could work in our mainframe NATURAL/ADABAS environment, an alternative architecture was available. However, there were a number of risks. The deadline for demonstrating CCMTA data exchange capability was March 31, 2001. This was a product set that no one in the development team had any experience with, and, if the learning curve was too protracted, we were in danger of missing the deadline. Our NATURAL installation was Release 2.2.8, and there was some question as to compatibility with Treehouse. Since RMV is a dynamic system with regular enhancements, bug fixes, and legislative changes, the manual export from ADABAS to ORACLE as suggested in the initial architecture proposal was also threatening the timeline.

An evaluation copy of **tRelational** and **DPS** arrived just before Christmas 2000, and arrangements were made with the mainframe service providers for installation. Also, to minimize installation risks and lower the learning curve, Compliance decided to take advantage of Treehouse

Software's pilot project offer and bring their consultants on site to do the initial materialization demonstration. **Wayne Lashley** and **Dan Sycalik** arrived on a Tuesday in early January and, after spending the first three days clearing up installation issues (mostly NATURAL and individual file security), managed to demonstrate a materialization to the ORACLE database on day four. After the successful demonstration and a collective sigh of relief, the project team was committed to using Treehouse.

tRelational as an ADABAS modeling and analysis tool was invaluable in identifying ADABAS data elements and attributes, and generating ORACLE tables.

Over the next two months, while one part of the development team concentrated on the Web front-end, client interfaces, and web server implementation, the other group delved into migration of the data from RMV to ORACLE. For the initial release of CAPS, five main RMV ADABAS files were used comprising some 8,000,000 records. During the migration (materialization) effort, Treehouse support was efficient and effective in identifying and resolving product and data issues, with the end result of the initial materialization completed by mid-March and data interchange capability with CCMTA successfully demonstrated prior to the deadline. Of the lessons learned, the most significant would be to gain intimate knowledge of the data prior to materialization efforts. Due to the operational life span of RMV with the numerous extensions and enhancements, that knowledge was not held by any one person and was often discovered by trial and error (e.g., ORACLE and ADABAS treat NULL primary key fields differently). **tRelational** as an

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We also received some comments from **Tom Stroud**, Technical Lead for the SNSMR project.

How did tRelational impact the data migration schedule?

If we were to create manual extracts of the ADABAS data to populate our ORACLE back end, it would have at least quadrupled our development time.

How maintainable are tRelational and DPS ?

Following our initial materialization, we have added additional functionality to our application that requires bringing more ADABAS files into our ORACLE database. This is simply a matter of "Implementing" the new ADABAS files through **tRelational**, and then running a few batch jobs to migrate the data. (A very simple process!)

How do tRelational and DPS affect your current ORACLE environment?

tRelational allows for the importing of existing structures or generating new ones from the ADABAS file structure. We currently have an environment where both **tRelational** generated and pre-existing tables are being used. The existence of our **tRelational** generated structures alongside our other application tables allows us to easily incorporate the legacy mainframe data into our new Web-based application.

What lessons were learned during the implementation?

If I were to pass along one piece of advice to others it would be: Know your data prior to implementation. The reason I say this is we were new to the data, and because of this, we found instances that where fields we would have expected to be unique on the mainframe actually were not. Usually this was due to some legacy fields not being used consistently throughout the various pieces of the old mainframe system. This initially threw off some of our primary key assignments on the **tRelational** generated tables. When we became aware of this, both **tRelational** and **tRelationalPC** provided a quick means of re-defining our field relationships.

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...the end result is a preserved investment in the existing RMV ADABAS application...

ADABAS modeling and analysis tool was invaluable in identifying ADABAS data elements and attributes and generating ORACLE tables. However, it is not a substitute for an up-to-date data dictionary.

The other benefit demonstrated with the materialization/propagation approach was the cost savings in mainframe charges. With the final materialization run completed and **DPS** propagation now run as a regular nightly process, cost metrics have shown that mainframe charges resulting from a full materialization against the RMV ADABAS data files are orders of magnitude greater that the **DPS** propagation process running against the transaction log.

With the first phases delivered and the initial CAPS release about to go into production, the end result is a preserved investment in the existing RMV ADABAS application and a Carrier Profile System that has been well received and endorsed by those who have viewed it. The next CAPS phases, convictions and collisions, are now under development. The Compliance Unit is considering more widespread distribution to other agencies with an interest in this information (e.g., law enforcement) as per an expanded vision. ●

Editor's note: Thanks to **Wayne Richard**, Business Solutions Manager for the SNSMR project, for providing this article, and to **Tom Stroud**, Technical Lead for the SNSMR project, and **Dan Sycalik**, TSI Project Manager, for their contributions to this article.

SNSMR Consulting Visit by Dan Sycalik

SNSMR contracted a one-week consulting site visit from TSI to assist with **tRelational** modeling and mapping and **DPS** "Implementation". The technical lead assigned to the Carrier Profile project was skilled with ORACLE but was not conversant with IBM mainframe, ADABAS, NATURAL, or the source application data.

We began with a review of the technical environment and met with the ADABAS DBA, the ORACLE DBA, and others to agree on naming conventions, logon ids, ORACLE table space, etc.

A golden rule for data modeling is "know your data".

We continued with a **tRelationalPC** ODBC Import of the ORACLE Schema and a mapping of the source ADABAS fields. Several questions prompted a meeting with the applications staff. Following a discussion, they viewed the data with ad hoc queries and discovered the data was different than expected.

> **Note:** This is not uncommon, and **tRelational** provides statistical analysis specifically to provide a better understanding of the application data. A golden rule for data modeling is *"know your data"*. To that end, we discussed the benefits of **PEEK**, an ADABAS "File Browser", distributed by TSI.

We altered the model to account for the new discoveries and generated the ORACLE DDL and the DPS parameters. We executed **DPS** Materialization and loaded the data to the ORACLE tables. We discovered several data related issues, such as invalid dates and non-unique Primary Keys. We discussed the issues and options during a status meeting with project managers.

Despite the many unexpected data discoveries and data issues, we materialized the data and the technical lead had the 'building blocks' to successfully implement the procedures without further consulting assistance.

Demo TSI Products On-line

To set up a live, on-line demonstration of any TSI product, simply fill out the short form on the Treehouse Software Web site at **www.treehouse.com/webexform.html**. All you need is an Internet connection and a current Web browser (Netscape, Internet Explorer, etc.) to see TSI products in action right on your PC screen.

Become a Beta Test Site for TSI Products

We are looking for **current North American customers** to become Beta test sites for new releases of TSI products. If you are interested in becoming a Beta test site, please fill out the short form at **www.treehouse.com/betasites.html**, and a TSI representative will contact you.

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**.

APC helps DPS with CDC (Huh?) By Larry Jones and Dan Vimont

In the **Editor's Sproutings** column in **TREETIPS #32**, the new ADABAS PLOG Consolidation (APC) Utility in **DPS** was announced. This new feature will be available in the next release of **DPS** (V4.1.0).

The purpose of APC is to enhance the efficiency of both the **DPS** Propagation Transformation process and subsequent SQL-transaction processing in the target RDBMS through removal of logically extraneous PLOG images (i.e., PLOG Consolidation).

Understanding ADABAS PLOG and DPS Propagation

During the normal operation of ADABAS, when a transaction (STORE, UPDATE, or DELETE) is applied to an ADABAS record, Before and/or After-Images of the record are written to the protection log (*PLOG*) file. Periodically, the PLOG is "swapped"– a new PLOG file is put into use and the old file becomes available. These PLOG files are the source of transactional data that **DPS** Propagation uses to derive the SQL "UPDATE", "INSERT", and "DELETE" statements, which, when applied, bring target RDBMS tables "in sync" with their source ADABAS files.

If a single physical ADABAS record is updated multiple times between PLOG swaps, the current PLOG will contain all of the Before and After-Images for each individual UPDATE transaction. Likewise, if a single physical record is inserted, updated multiple times, and then deleted, the PLOG will contain images for all of these transactions, including an After-Image for the insert, Before and After-Images for all updates, and a Before-Image for the delete.

> ### Here's where APC leaves the crowd behind...
>
> **APC is cognizant of primary and foreign key constraints (in the table(s) to which each ADABAS file is mapped). Any PLOG consolidation approach that does not take these target-table constraints into account will not be a 100% reliable tool for keeping ADABAS files "in sync" with target RDBMS tables.**

When processing a PLOG file (or set of PLOG files), the **DPS** Propagation process extracts the appropriate ADABAS transactions from the PLOG and typically derives one or more appropriate SQL ("UPDATE", "INSERT", and/or "DELETE") statement(s) from each ADABAS transaction (based upon user-specified ADABAS-to-RDBMS mapping instructions).
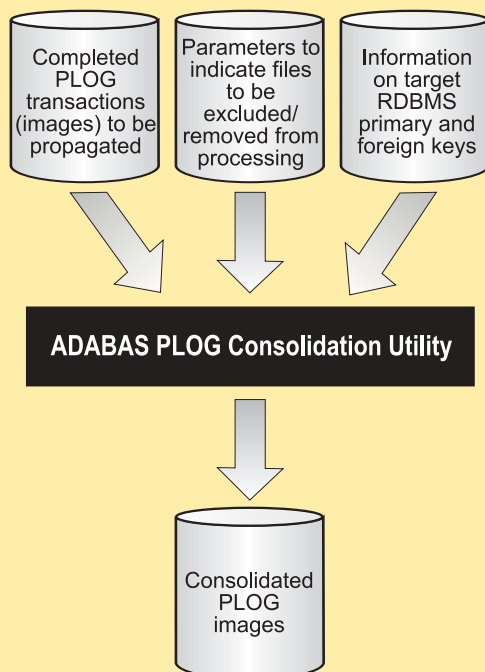
When multiple UPDATE transactions are applied to a single physical ADABAS record, standard **DPS** Propagation processing will derive SQL statements, as appropriate, for each and every ADABAS transaction. However, taken together, all SQL statements derived from an ISN-specific sequence of PLOG UPDATE transactions will contain all cumulative changes represented in the first Before-Image and the last After-Image for the given ADABAS record. Thus, the final state of the target RDBMS tables in standard, multi-update **DPS** usage will match exactly the state as would be derived if just the first Before-Image and last After-Image were used as the basis for a single set of SQL statements to be applied to the target RDBMS tables. Derivation and subsequent processing of *multiple* sets of SQL statements for the given target rows (as opposed to generation and subsequent processing of a *single* set of cumulative SQL statements for the target rows) could be considered a waste of time and resources in situations where absolute *transactional integrity* is not required.

Similarly, if the final ADABAS transaction for a physical record is a delete, then it could be considered a waste of time and resources to process any preceding ADABAS transactions against that physical record (deriving extraneous RDBMS INSERT and/or UPDATE statements for target rows that will ultimately be deleted).

Since the processing of **DPS**-outputted SQL statements by the target RDBMS SQL-Processing Utility often represents the worst bottleneck in the data propagation (CDC) process, the removal of extraneous transactions can potentially be of great benefit.

In summary, the goal of Treehouse Software's APC utility is to reduce the workload of these SQL-processing utilities by reducing the volume of SQL statements that are generated by **DPS**.

Completed PLOG transactions (images) to be propagated

Parameters to indicate files to be excluded/removed from processing

Information on target RDBMS primary and foreign keys

ADABAS PLOG Consolidation Utility

Consolidated PLOG images

How APC Works

APC "consolidates" the PLOG file by removing PLOG images with actions that are rendered extraneous by subsequent images. For example, in the case where multiple ADABAS UPDATE Before and After-Images are present for the same ADABAS record, APC may eliminate all images except the Before-Image for the first update and the After-Image for the final update, thereby "consolidating" the images down to a single update Before/After pair of images. This results in **DPS** Propagation's deriving a single set of SQL statements instead of multiple sets of statements.

Additionally, for the case where an ISN-specific set of PLOG images is comprised of a STORE, several UPDATEs, and a DELETE, APC will completely eliminate *all* of the images, resulting in no SQL statement being generated by **DPS**.

Most importantly, APC is cognizant of Primary and Foreign Key constraints in the table(s) to which each ADABAS file is mapped. Without this capacity, APC (or any other product that attempts PLOG consolidation) would leave itself open to violations of RDBMS transactional integrity with respect to Primary Key and Foreign Key constraints. In other words, any PLOG consolidation approach that does not take these target-table constraints into account will not be a 100% reliable tool for keeping ADABAS files "in sync" with target RDBMS tables. ●

APC's Architecture

The following diagram illustrates the inputs and outputs of the APC utility:
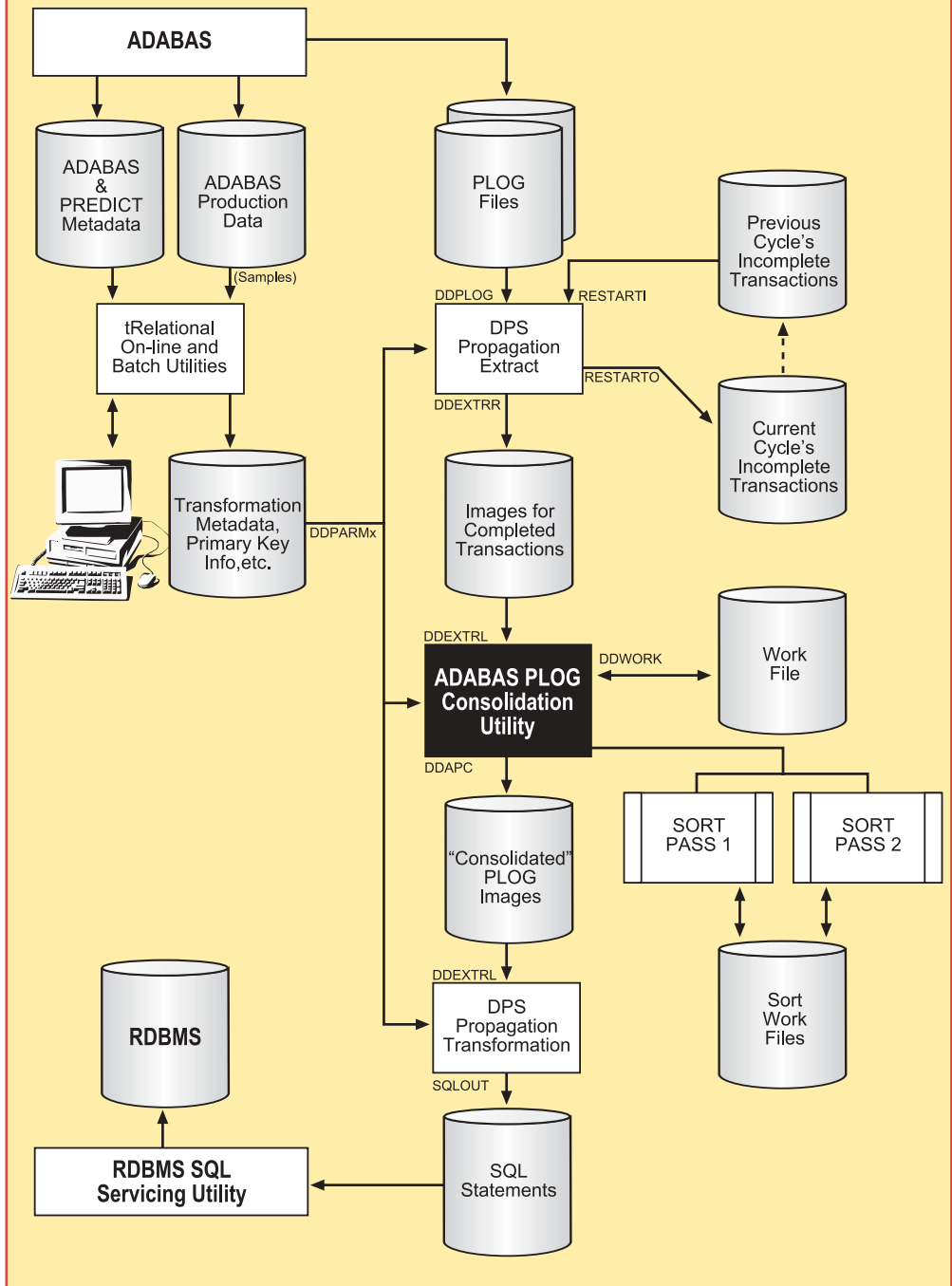
Larry Jones is a Senior Product Designer at TSI. Larry was formerly the Vice President of Product Development in Software AG's Seattle development office.

Dan Vimont is TSI's Project Leader for the development of **tRelational**, **DPS**, and TSI's associated relational products.

TREETIPS

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 "**R**edundant **A**DABAS **C**all **E**liminator"

* **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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