Platform and Data Migration With Little Downtime

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This is the story of an Application Partner and one of their large customers as they traveled through the land of a major Application change and Platform change.
Once upon a time . . .
The Customer

- A large company in Canada
  - 15,000 Employees
  - Agriculture, Construction & Equipment
  - Consumer Products
  - Hydro Energy, Food
  - Forestry & Forestry Products
  - Retail & Distribution
  - Shipbuilding & Industrial Fabrication
  - Transportation & Logistics

They run several different OpenEdge Applications

Very Tight Change Control Process
The Environment

- Production database on AIX
- Database is 150 GB in size
- Connections include
  - WebClient talking to an AppServer
  - Webspeed for customers
  - Dataserver to interface to an external SQL based mobile app
  - Pro2SQL keeps a reporting database current for business reporting needs
The Problem

- Migrating platforms from an older AIX machine to a Linux machine
  - Linux machine is in a different city
- Upgrading the application to a new version which includes “domains”
  - All tables now include a new mandatory domain field that must be populated
  - This new field is the first component of all indexes
- Downtime window does not allow for a dump/load and then data migration
Typical Platform Migration

1. Install OpenEdge
2. Copy Application
3. Configure Application
4. Migrate Data
5. Testing Support
6. Migrate Data
Typical Platform Migration

Install OpenEdge → Copy Application → Configure Application → Migrate Data → Testing Support → Migrate Data

Drink Beer
Typical Platform Migration

1. Install OpenEdge
2. Copy Application
3. Configure Application
4. Migrate Data
5. Testing Support
6. Migrate Data
Migrate The Data

- Migrate the Data
  - Dump on AIX - Binary
  - Load on Linux - Binary
  - Index Rebuild
  - Add new schema fields
  - Populate new schema fields
  - Add new schema indexes
  - Index Rebuild
Migrate The Data

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This needs to be done 2 times. For testing then for Production
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In reality, we did this 8 times. 7 times in testing, then 1 time for Production
Not done yet
The Pro2SQL Target needed to be available as part of the Migration on Day 1
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Traditional Methods will not work
Since Pro2SQL is already in place, can we leverage that technology to do the data migration?
Pro2 SQL

We can leverage the OpenEdge target
Pro2SQL has a feature where it can replicate to multiple target databases. We will use this to replication to their SQL Server database and to the Linux OpenEdge database. During the replication the new fields will be added and populated.
Need to create this data flow
Concerns

- **Concern 1**
  - The AIX to SQL Sever Pro2 was not replicating all tables
  - The AIX to Linux OpenEdge Pro2 needs to replicate almost all tables

- **Concern 2**
  - The OpenEdge database will not have the exact schema that the application expects, hence the application cannot run
Pro2 Components

- Change Data Capture
  - Replication Trigger Based
  - Keeps track of all updates
  - Adds to a Replication Queue

- Replication Process
  - Manages the Replication Queue
  - Pushes data to the SQL Server
Pro2 with Multiple Targets

- The CDC part of Pro2 is a table called Replqueue
- When sending data to 2 targets...
  - There is a logical field called “Applied”
  - When Applied = No – we need to replicate to target 1
  - When Applied = Yes – we need to replicate to target 2, then delete the record.
For tables that are not being replicated to SQL they are assigned to a specific thread and periodically a cron job comes in and marks all the rows as applied on that thread. Then normal replication processes, only pushing this data to the new Linux OpenEdge machine
This solves Concern 1
Different Schemas

- The Linux OpenEdge target now has SQL plumbing fields
  - Prorowid – holds the source records rowid – Primary Index
  - Pro2created
  - Pro2modified
  - Pro2SrcPDB

- The application is not compiled with these fields in mind. R-code will not match
The effort to remove this plumbing from all the tables took less than 20 minutes.

Schema Versioning introduced in Progress 9.1 will bring the records current when they are updated.
This solves Concern 2
St Johns

Existing Environment

Moncton

Database

AppServer

AIX

Pro2

SQL

New Environment

Transform

Moncton

Database

Linux

Moncton

Existing Environment

Moncton

Pro2

SQL

New Environment

Transform

Moncton

Database

Linux
Checkpoint

- At this point we have the data migrated. The database is ready for test.
- To test, we needed to copy this database, remove the Pro2 plumbing and let the customer test the application.
- We refreshed the test environment 4 times using this method.
St Johns

Existing Environment

Moncton

Database <-> AppServer

AIX

Pro2 SQL

SQL

Moncton

New Environment

Linux

Database <-> AppServer

Moncton

One more data flow
This is standard Pro2SQL. The only trick was to not map the Pro2 plumbing fields on the source side, since they will be needed and used differently on the SQL target side.
**Database**

**AppServer**

**Pro2**

**SQL**

**Moncton**

**Existing Environment**

**St Johns**

**AIX**

**Linux**

**New Environment**

**Transform**

**Database**

**AppServer**

**Pro2**

**SQL**

**Moncton**
Cut-over Day

- Make sure that the Replication is caught up for the AIX to Linux data flow
  - No records in the replqueue table
- Turn off Replication from AIX to Linux
- Shutdown to remove the Pro2 plumbing
- Test and redirect users to the new environment
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Cutover took 20 minutes
That was the total downtime
This important piece was populated and ready to go day 1
Summary

- There are tools available within Progress to help with many problems – this is one of them
- This same technology can be used for other activities like
  - Dump and Load
  - Migration to Table Partitioning
Want Answers

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