



# Maine's Successful Modernization of its Legacy Integrated Tax System

*Maine Revenue Integrated Tax System (MERITS) Project*

*August 3<sup>rd</sup>, 2010*

# Introductions



## **Jerome Gerard – Maine Revenue Services (MRS)**

- Acting Executive Director

## **Roger Widner – AdvanTech, LLC**

- MRS MERITS Project Manager

## **Danny Reeves – Revenue Solutions Inc. (RSI)**

- RSI MERITS Project Manager

# Agenda



- MRS Modernization Journey
- MERITS Project Overview
- MERITS Technical Overview



# MRS Modernization Journey



# MRS Modernization Journey

## *Determining the need to Modernize*



- MRS Legacy Integrated Tax System
  - Installed in 1990
  - First transfer of Accenture (formerly Andersen Consulting) tax administration software
- Factors that influenced the decision to modernize
  - Twenty year old technology
  - Hiring and retention of IT resources
  - Strategic direction of the state was to migrate off the mainframe
  - Operational risk due to reliance on imbedded proprietary technology

# MRS Modernization Journey

## *Evaluation of Modernization Options*



- MRS evaluated the following options:
  - Custom System
    - Risky and expensive
    - Legislative support unlikely
  - Off-the-Shelf (COTS) Packages
    - Extensive modifications to provide similar business capability
    - Quantum leap-forward was not evident
    - Limited control of our own destiny
  - Re-engineering
    - Lowest cost and least risky option
    - Not a common modernization approach in Revenue Industry
    - Could it accomplish our modernization objectives?

# MRS Modernization Journey

## *MRS Modernization Issues to be Addressed*



- MRS evaluated whether re-engineering could address the following issues:
  - Should we migrate off the State's mainframe computer and, if so, when?
  - What to do with the COBOL code?
  - How to engineer modern screens with the latest in software?
  - How to replace the notice generating functionality?
  - How to simplify and replace the forms definition facilities?

# MRS Modernization Journey

## *Decision to Select a Re-engineering Solution*



- Survey of our user community convinced us that our current system met the majority of our business needs
- RSI proposed a re-engineering solution that:
  - Addressed our modernization issues with comparative savings of **greater than 50%** compared to other options such as COTS and custom solutions;
  - Migrated the application to a Services Oriented Architecture (SOA);
  - Eliminated the need to “start over” or “step backwards” by retaining all of our existing business capability;
  - Minimized agency risk through a phased approach;
  - Allowed for gradual migration of technology and staff.

# MRS Modernization Journey

## *MERITS Project Results*



- Project met and exceeded expectations
- Notable elements from the project:
  - MRS is equipped with a state-of-the-art system that can readily adapt to future growth and changes in technology;
  - Multiple positive impacts on MRS employees;
    - MRS user community did not lose any productivity throughout the entire project;
    - The in-house programming staff is able to maintain and enhance the system;
    - Aggregate staff productivity statistics indicate there is significantly more output;
    - Routine annual form definition updates can be accomplished by business analysts, freeing up programming staff;
    - New employees experience a much shorter learning curve;
  - The install group was small in number, but adequate, which surprised us;
  - All legacy data was preserved; and,
  - Re-engineering worked for MRS and can work for other agencies.



# MERITS Project Overview



# MERITS Project Overview

## *Independent Project Manager Role*



- Participated in the full life cycle – requirements, approach decision, RFP, contract, planning, implementation and acceptance
- Balanced stakeholder interests – MRS, OIT, RSI
  - Organized Steering Committee
- Established project objectives
  - Retain all required functionality
  - Get off the mainframe
  - Comply with state architecture, standards, and enterprise services
  - Focused enhancements – Noticing, Online Posting, Forms
  - Internally supported
- Developed risk mitigation strategies

# MERITS Project Overview

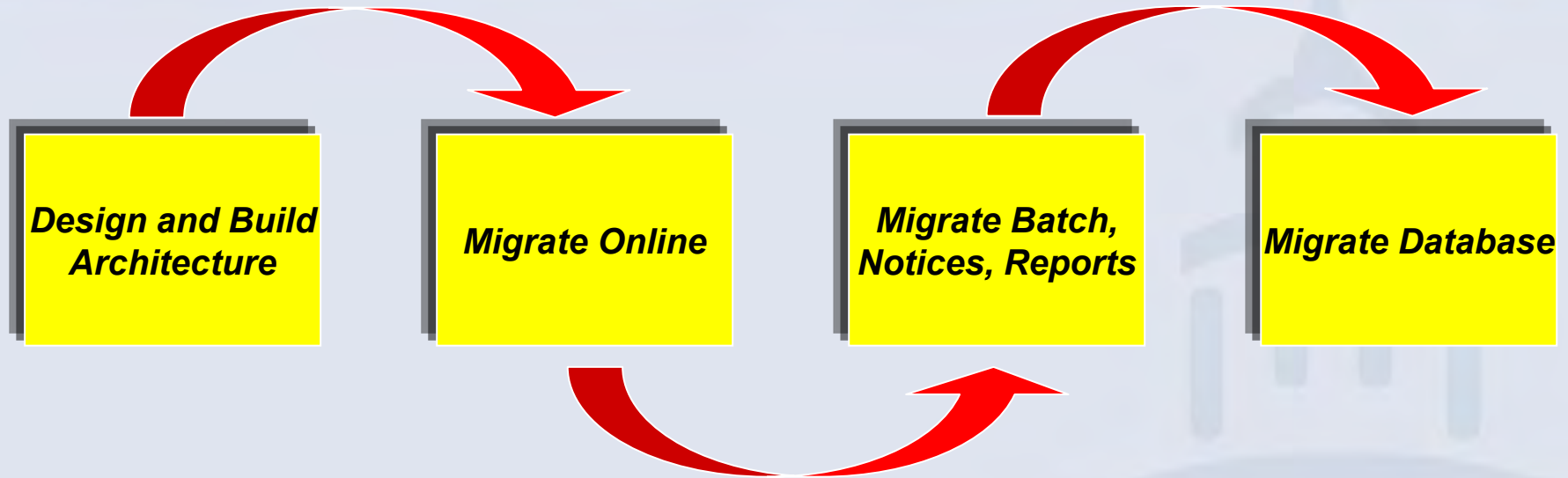
## MERITS Project Timeline



	2006		2007				2008				2009				2010	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
POC	POC															
Phase 1			Build Architecture Migrate On-line													
Phase 2							Rewrite Notices									
Phase 3							Migrate Batch & Reports									
Phase 4											Migrate Database / Enhance Functions					

# MERITS Project Overview

## *MERITS Implementation Strategy*



- Traditionally, implementation of an integrated system requires all technology components for a subset of tax types.
- Implementation of a re-engineered integrated tax system focuses on incremental migration of the technology across all tax types.

# MERITS Project Overview

## *MRS Participation*



- MRS provided resources for the following roles:
  - 4 Application Testers and 1 Testing Lead Coordinator;
    - MRS was primarily responsible for System and User Acceptance Test execution
  - 4 Full time Subject Matter Experts;
  - 4 Full Time Developers;
  - 2 Full Time Project Managers;
    - Independent PMO
    - MRS Project Manager
  - 2 Trainers; and,
  - 1 Technical Team Leader.

# MERITS Project Overview

## *Critical Success Factors / Lessons Learned*



### ■ Critical Success Factors

- Strong Project Sponsorship;
- Solid Client/Vendor Relationship;
- Legacy system as fallback option virtually eliminates deployment risk;
- Project Team knowledge of legacy application; and
- “Third Party” Project Management Role.

### ■ Lessons Learned

- Impact of server hardware on batch performance;
- Limited institutional knowledge of infrequently executed batch programs; and,
- Production size/like database for testing.



# MERITS Technical Overview



# MERITS Technical Overview

## *Re-engineered ... not Reinvented*



- The MERITS project re-engineered, migrated and trained the following inventory of programs, data and end-users:
  - Over 250 online programs and over 200 batch programs, containing more than 3.5 million lines of COBOL source code, were automatically translated into Java;
  - Over 250 online mainframe green screens were automatically transformed into modern web-pages built in ASP.NET;
  - Over 4,700 imbedded SQL calls were extracted into a separate data access layer;
  - Over 300 reports were converted from Easytrieve into COGNOS;

# MERITS Technical Overview

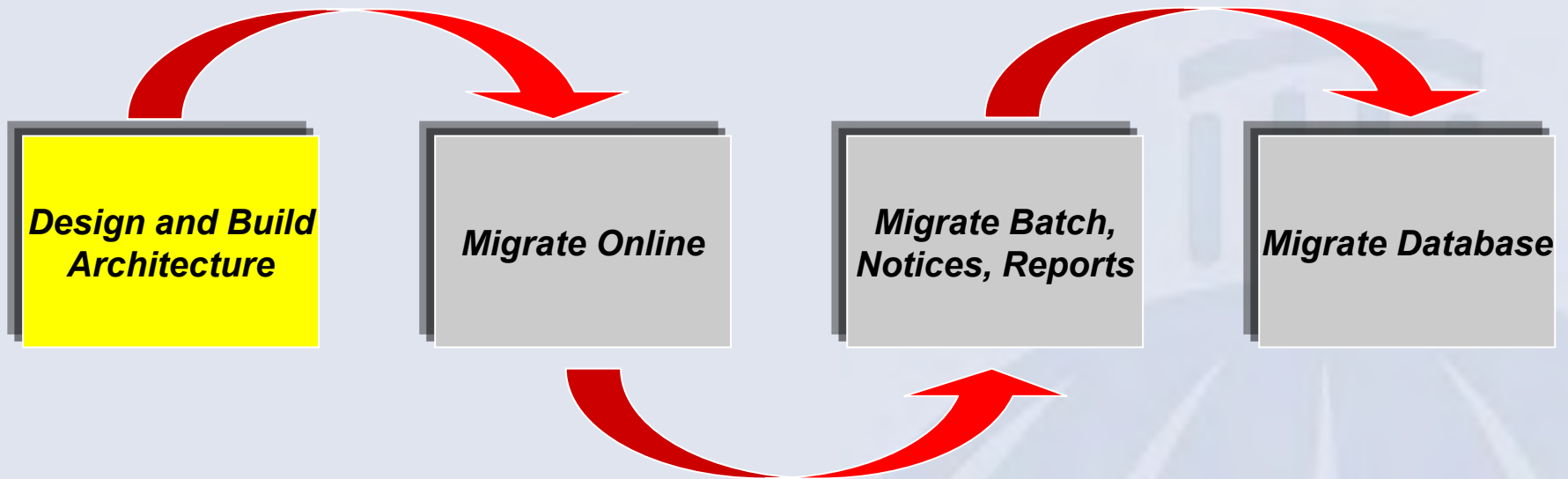
## *Re-engineered ... not Reinvented*



- Over 200 notices were converted from Document Composition Facility into DOC1;
- Over 300 jobs were converted from IBM Job Control Language to Job Control Script;
- Over 400 codes tables were converted from VSAM to Oracle;
- Over 750 million records converted from DB2 to Oracle; and
- Over 300 end-users were trained on the modern, browser-based GUI.

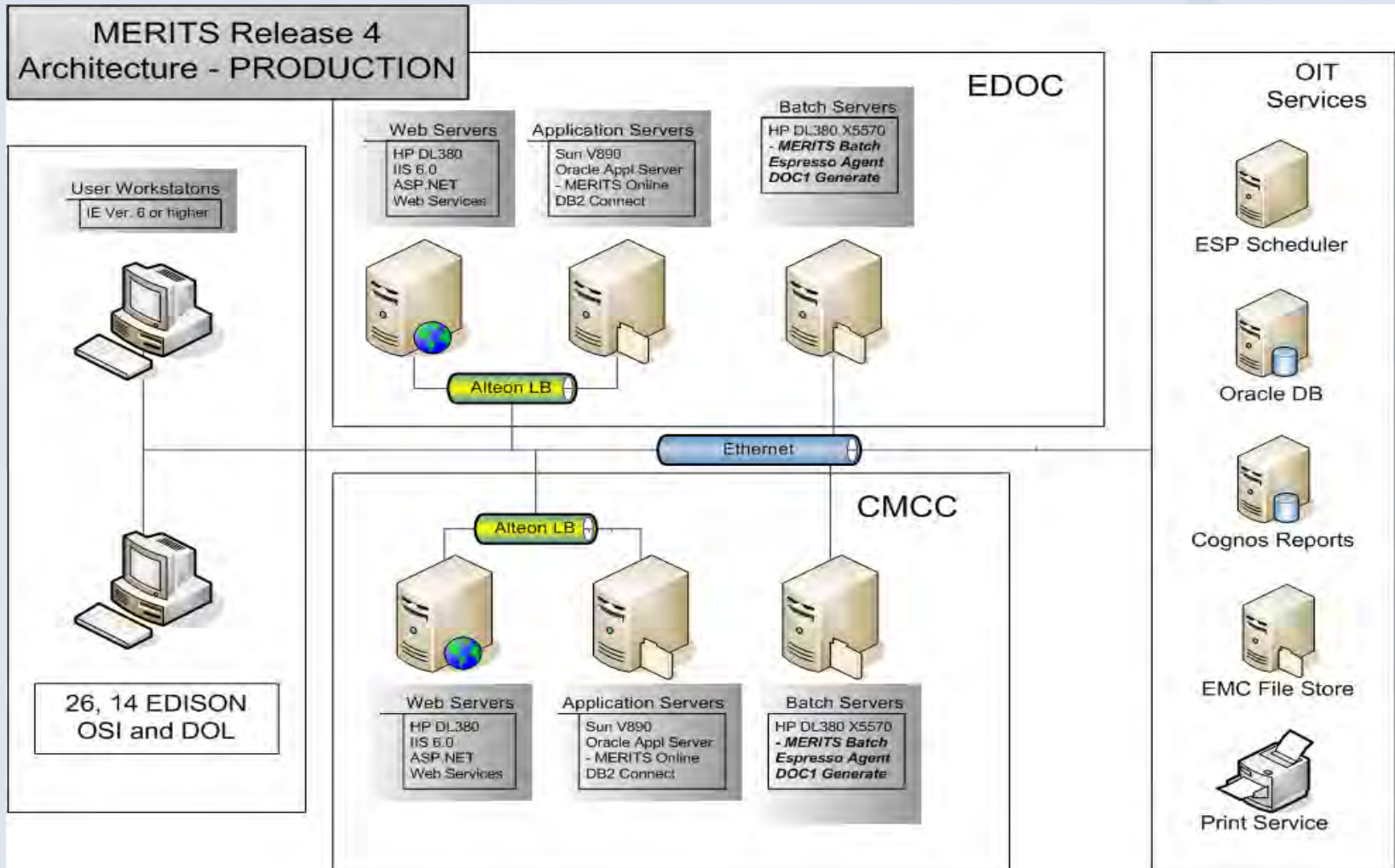
# MERITS Technical Overview

## *MERITS Implementation Strategy*



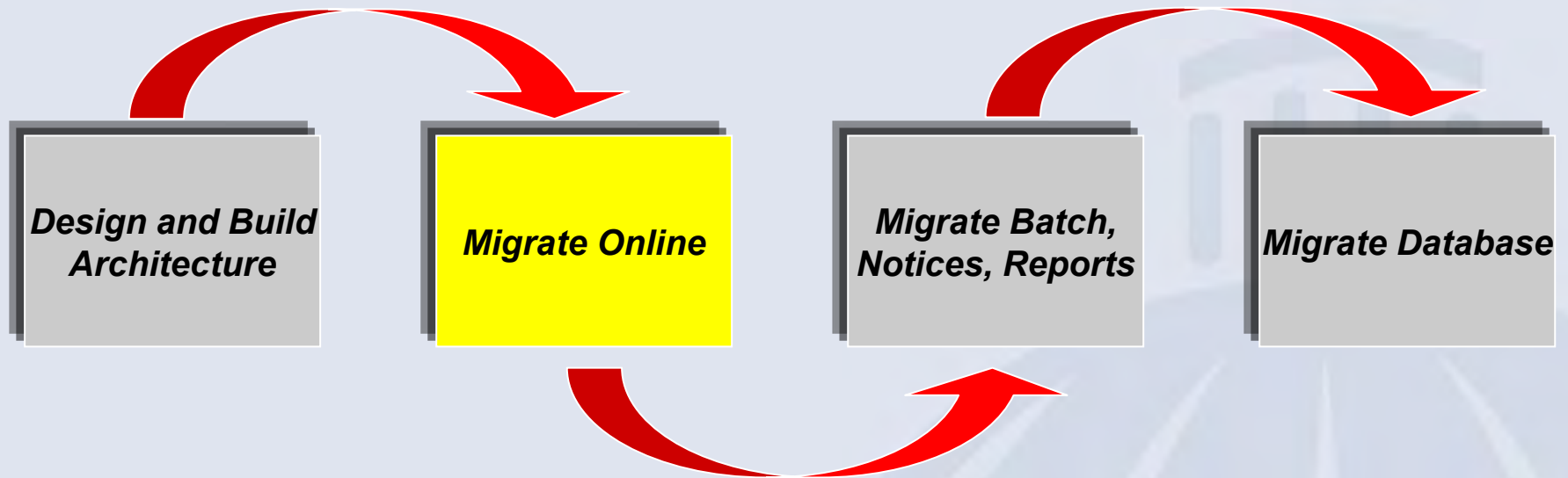
# MERITS Technical Overview

## MERITS Distributed Architecture



# MERITS Technical Overview

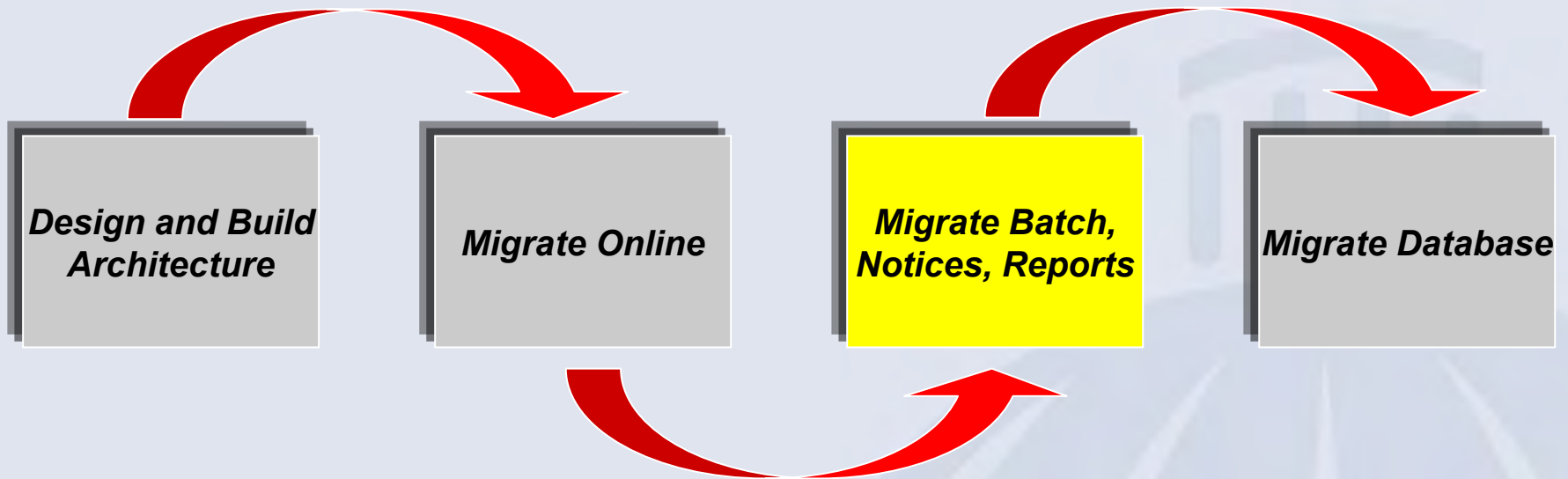
## *MERITS Implementation Strategy*





# MERITS Technical Overview

## *MERITS Implementation Strategy*



# MERITS Technical Overview

## *Translation Process*



- The process to translate the application from COBOL into Java relies on automated tools:
  - Pre-processor
    - Prepares code for translation
  - CORECT software
    - Produces a one for one COBOL to JAVA translation
  - Post-processor
    - Extracts SQL into a Data Access Layer
    - Inserts method calls for MetaCOBOL macros
    - Renames particular variables based on developer input/preference

# MERITS Technical Overview

## Translation Process



```
examples\tests\examples-all\loan.cbl  
  
IF LOAN-LENGTH > 4 THEN  
    COMPUTE START-YEAR = LOAN-LENGTH  
ELSE  
    COMPUTE START-YEAR = 0.  
  
IF INTEREST-RATE > 0.4 THEN  
    COMPUTE START-INTEREST = INTEREST-RATE  
ELSE  
    COMPUTE START-INTEREST = 0  
END-IF  
  
MOVE 1 TO YEAR-ROW.  
  
THRU THE NUMBER OF YEARS
```

Java - Loan.java - Eclipse SDK

File Edit Source Refactor Navigate Search Project Run Window Help

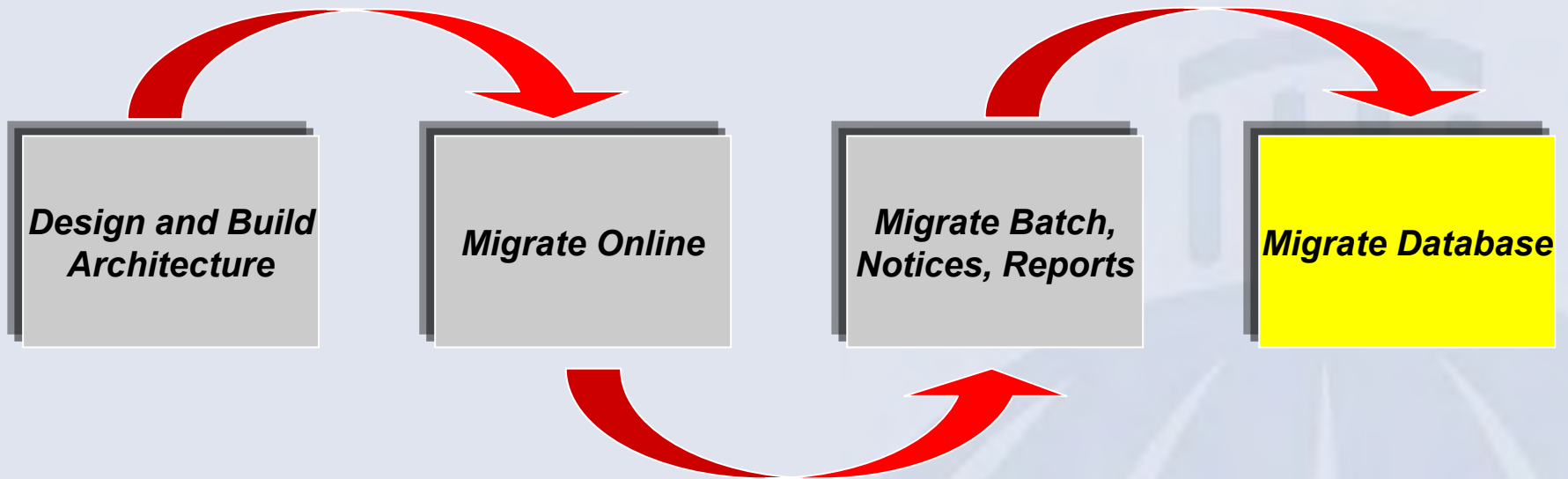
Loan.java X

```
if (wsVars.getLoanLength() > 4) {  
    wsVars.setStartYear(wsVars.getLoanLength() - 4);  
} else {  
    wsVars.setStartYear(0);  
}  
  
if (wsVars.getInterestRate() > 0.4) {  
    wsVars.setStartInterest(wsVars.getInterestRate() - 0.4);  
} else {  
    wsVars.setStartInterest(0.0);  
}  
  
wsVars.setYearRow(1);  
// -  
// GO THRU THE NUMBER OF YEARS  
//
```

Writable Smart Insert 67 : 42

# MERITS Technical Overview

## *MERITS Implementation Strategy*



# MERITS Technical Overview

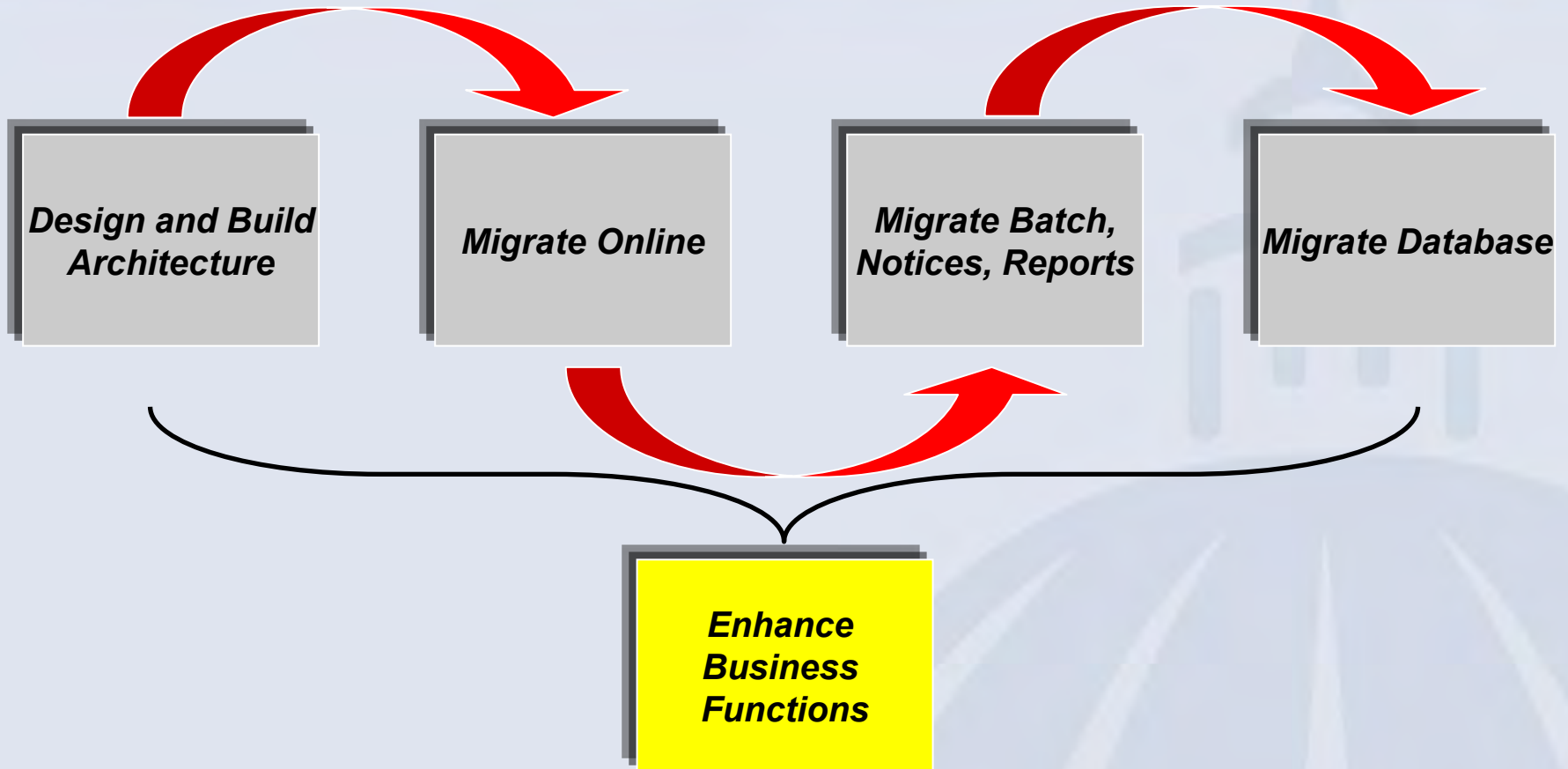
## *Migrate Database*



- Migrating from DB2 to Oracle
  - Maintained the existing data model
    - Except forms data, which is converted into XML
  - Updated the DAL layer
  - Retained 100% of current data
    - No conversion routines, summary data, etc.
  - Executed full mock conversions

# MERITS Technical Overview

## *MERITS Implementation Strategy*



# MERITS Technical Overview

## Enhancements: On-line Help



The screenshot displays the 'MERITS - F112 - Maintain Account' application window. On the left is a menu with options like 'Taxpayer Identification', 'Return and Payment Pr', 'Taxpayer Accounting', 'Case Management', 'Correspondence', and 'Other'. The main area shows the 'ACCOUNT REQUEST - F1M0027' screen. An overlaid help window titled 'F1M0027 - Windows Internet Explorer' is open, showing a 'Show' button circled in red. The help text explains that the screen allows users to search for accounts or initiate new ones. Below the text is a table of valid field combinations.

ENTITY ID	ACCT TYPE	ACCT ID	FCN KEY	ACTION TAKEN
X			<ENTER>	ACCOUNT LIST (>1 record found) ACCOUNT DETAIL (1 record found)
X	X		<ENTER>	ACCOUNT LIST (>1 record found) ACCOUNT DETAIL (1 record found)
X	X	X	<ENTER>	ACCOUNT LIST (>1 record found) ACCOUNT DETAIL (1 record found)
X	X		PF11	ACCOUNT DETAIL screen (to add an account)
X	X	X	PF11	ACCOUNT DETAIL screen (to add an account)
X	X		PF15	TAXPAYER LOOKUP conversation ACCOUNT NEW ENTITY

- *MERITS contains an extensive On-Line Help documentation system. It can be accessed from either the screen where you need help, or from the Help Icon on the Application Toolbar.*
- *By clicking the “Show” button on the help screen, you will gain access to the Table of Contents and Index of Help.*

# MERITS Technical Overview

## Enhancements: Forms Definition Workbench



Define Filing Period | Define Tax Form | Association

Selected Forms Def: L3800201

FORM LINE SEQ NUM	LITERAL	LINE NUMBER	KEYED	REQUIRED	BYPASS	MODIFIABLE	PARENT LINE
1	ID-ACCT	ACTID	Y	Y	N	Y	0
2	REMITTANCE	REM	Y	N	N	Y	0
3	SOURCE-CODE	SC	Y	N	N	Y	0
4	IMMEDIATE-SUSPENSE	SUSP	Y	N	N	Y	0
5	TOTAL-LBS	1	Y	N	N	Y	0
6	TAX-DUE	2	Y	N	N	Y	0

Select (F5) | Insert (F6) | Update (F7) | Delete (F8)

*Routine updates are now performed by business analysts*

Update Line Item

Line Item Def:

- TOTAL-LBS (Special Indicator: 924)
- TOT-ALLOW (Special Indicator: 988)
- TOTAL-PRTN (Special Indicator: -31)
- TOTAL-QTY-REDEEMED (Special Indicator: -316)
- TOTAL-QTY-SOLD (Special Indicator: -315)
- TOTAL-SALES-TAX (Special Indicator: 404)
- TOTAL-TAX (Special Indicator: 214)
- TOTAL-TAXABLE-SALES (Special Indicator: 403)
- TOTAL-TAX-FEDERAL (Special Indicator: 809)
- TOTAL-TAX-PAYMENTS (Special Indicator: 136)

Line Number: 1 | Keyed: | By Pass: N | Modifiable: | Full Description: TOTAL POUNDS | Short Description: | Update (F4) | Cancel (F10)

Edit Rules

FORM LINE SEQ NUM	LINE NUMBER	EDIT TYPE	OUTPUT TYPE	RULE
13	4	A	Error	IF (AND(\$3 > \$2, \$4 > 0), 1850,0)
14	7A	A	Error	if (AND(\$6 = "N", \$7A > 0), 1850,0)
15	7B	A	Error	if (AND(\$6 = "N", NOT (WITHIN ((\$7B - \$5), -2, 2))), \$Error, 0)
16	5	A	Error	if (AND(\$6 = "Y", NOT (WITHIN (\$5 - (\$7A + \$7B), 0, 1148), 0))
17	6	A	Error	if (AND(\$6 <> "Y", \$6 <> "N"), 1148,0)
18	1	T	Error	IF (\$1 < 0, +2282,0)

Insert (F6) | Update (F7) | Delete (F8) | Rules Data (F2) | CDT Errors (F3) | Generate (F5) | Test Form (F9)

Process Edit Rule

Line Number: 7B | Edit Type: A | Output Type: Error

Rule: if (AND (\$6 = "N", NOT (WITHIN ((\$7B - \$5), -2, 2))), \$Error, 0)

IF | Append Func

- 1484 (INVALID SELECTION)
- 1517 (INVALID OR NEGATIVE MONEY)
- 1518 (INCORRECT ALLOWANCE)
- 1519 (EXEMPTION > ZERO)
- 1520 (INCORRECT BUSINESS TAX CR)

Update (F4) | Cancel (F10)

# MERITS Technical Overview

## *MERITS Enhancements*



- A re-engineered MERITS includes the following enhancements:
  - Online Help
    - provides online access to updated user documentation from the reengineered application;
  - Forms Development Workbench
    - provides a modern GUI for defining tax forms and use of XML based data storage to improve reporting capabilities of form information;
  - Online Posting of Corrected Suspended Returns
    - when a suspended return is corrected by an end-user, the return is validated and either re-suspends or posts to the taxpayer's account typically in a matter of seconds or minutes instead of waiting for that night's batch cycle;
  - Data archiving
    - provides processes for removing unnecessary demographic, financial, case and correspondence data from the database;
  - *Codes Table Maintenance Console*
    - provides a modern administrator console for administering codes tables, with the ability to group codes tables based on business work units to improve the process when application changes, particularly annual changes require updates.

# MERITS Technical Overview

## Modern Technical Architecture



	<i>Legacy</i>	<i>MERITS</i>
<i>Platform</i>	IBM Mainframe	Windows and Unix
<i>Language</i>	COBOL	Java
<i>Presentation</i>	CICS	ASP.NET
<i>Database</i>	DB2	Oracle
<i>Architecture</i>	Monolithic / Reliant on Proprietary Technology	Distributed, Scalable and Flexible

# MERITS Technical Overview

## *Benefits of Re-engineering*



- If your current system meets the majority of your business needs, a re-engineering solution delivers the following:
  - Significantly lower cost, less risky modernization alternative;
  - Modern technical architecture with the flexibility to integrate modern components and to adapt to future changes in technology; and,
  - Preservation of existing business capability and data.