

Tcorem

Finding CPU and MSU Gold in Legacy COBOL Stored Procedures

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Agenda

- The DRDA/DDF Value Proposition
- Changes in Data Access
- IBM Hardware/ Software Changes
- DB2 Stored Procedure Evolution
- SQL/PL zIIP Redirect Growth
- Automating the COBOL to SQL/PL Conversion Process

The DRDA/DDF Value Proposition

- Select your Favorite Performance Tool
 - Measure your DRDA/DDF Workload
 - RMF Workload Activity Report
 - Within the workload, which packages spend the most CPU or elapsed time?
 - DB2 Accounting Trace (DDF)
 - SMF 30 Records
 - SMF30_TIME_zIIP_ON_CP:zIIP eligible work but overflowed to GP
 - SMF30_TIME_ON_zIIP:zIIP eligible work and actually ran on zIIP

The DRDA/DDDF Value Proposition

DB2 for z/OS V11 Language / API CPU Cost Comparison for IRWW Workload

Language/API	Base CPU/Tran Cost	Billable CPU/Tran Cost after zIIP redirect
COBOL Stored Proc	1X (BASE)	0.74x
C Stored Proc	1.02x	0.75x
SQLJ Stored Proc	1.71x	1.16x
JDBC Stored Proc	2.19x	1.54x
Native SQL Stored Proc	1.07x	0.47x

- Note : Stored Procedures called from IBM Type 4 JCC driver Client
- zIIP benefit is applicable only for remote Stored Procedures called via TCP/IP DRDA

Changes in Data Access

- Cell Phones Access
 - Specialty Apps
- On-Line Access to Information
- Internet of Things 24/7

Business Impact for DB2 Customers

Tremendous growth in DRDA/DDF remote access transactions

- **Increased MIP usage growth**
- **Increased MSU software cost**

IBM Hardware/Software Changes

- Z Series
 - Faster
 - Inter-grated with z/OS, DB2
- DB2 Performance Enhancements
 - Introduction of Stored Procedures
- Introduction of zAAP/zIIP Specialty Engines
 - Evolution of Eligible Workloads

DB2 Stored Procedure Evolution

DB2 for z/OS V4	Stored procedure functionality introduced
DB2 for z/OS V5	Caller of stored procedure can fetch rows from cursor declared and opened in stored procedure WLM-managed stored procedure address spaces introduced - recommended over DB2 managed stored procedure address space Support for Java stored procedures
DB2 for z/OS V6	DDL support -CREATE, -ALTER, -DROP PROCEDURE SYSPROCEDURES catalog table replaced by SYSROUTINES
DB2 for z/OS V7	SQL procedure language introduced (stored procedures written in SQL PL executed as C language programs via WLM-managed address spaces) COMMIT and ROLLBACK can be issued from a stored procedure
DB2 for z/OS V8	Abend limit can be set at individual stored procedure level (vs. DB2 subsystem level) DB2, z/OS work together to optimize the number of tasks in a stored procedure address space
DB2 for z/OS 9	Native SQL procedures introduced
DB2 for z/OS 10	Improved SQL PL performance RETURN TO CLIENT CURSORS User-defined functions can be written in SQL PL XML data type supported for parameters of native SQL procedures and "native" SQL UDFs

Figure 1: Stored Procedure History by Version

DB2 Stored Procedure Evolution

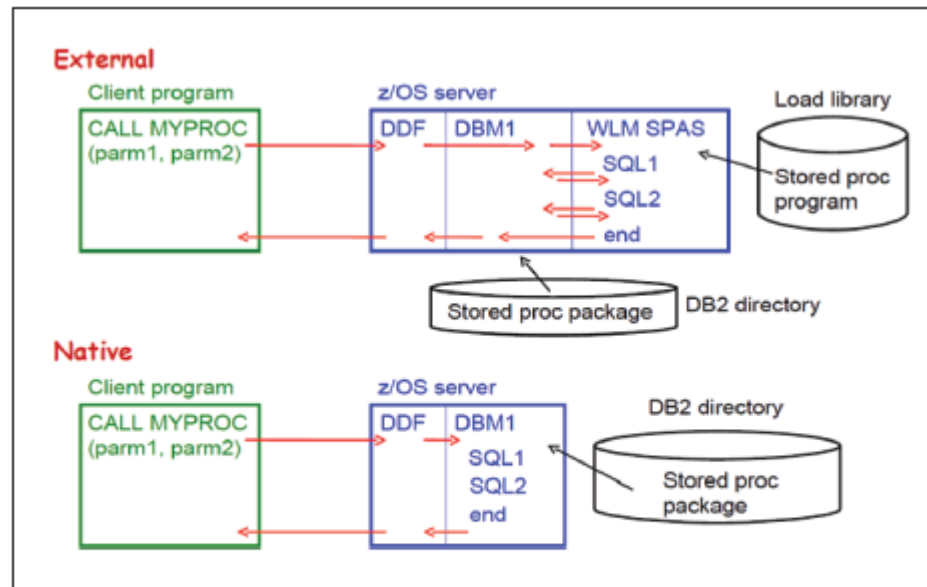


Figure 2: External vs. Native Stored Procedure Execution Path

SQL/PL zIIP Redirect Growth

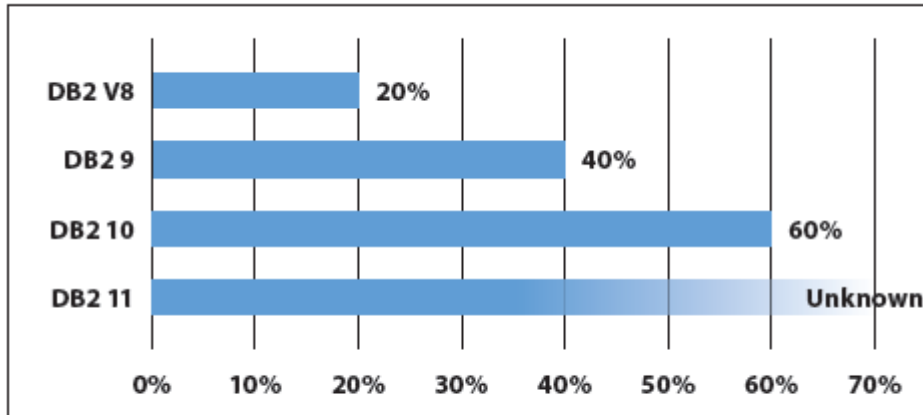


Figure 3: zIIP Redirect by DB2 Version

Automating the COBOL to SQL/PL Conversion Process

- Business Objective
 - Reduce MIP Usage
 - Reduce Software Cost
 - Improve Transaction Throughput

Automating the COBOL to SQL/PL Conversion Process

- Business Obstacles
 - Lack of Staff
 - Lack of COBOL to SQL/PL Conversion Knowledge
 - Low SQL/PL Language Knowledge
 - Cost

Automating the COBOL to SQL/PL Conversion Process

- 2014 Magazine Articles:
- April 2014
- [Native SQL Stored Procedures: Reduce System z Hardware/Software Cost and Improve Efficiency](http://enterprisesystemsmedia.com/article/native-sql-stored-procedures-reduce-system-z-hardware-software-cost-and-imp/3#sr=d&m=n&cp=d&ct=-tmc&ts=1425476378) by **Nate Murphy** & Elwin Harrison originally published in **Enterprise Tech Journal**
<http://enterprisesystemsmedia.com/article/native-sql-stored-procedures-reduce-system-z-hardware-software-cost-and-imp/3#sr=d&m=n&cp=d&ct=-tmc&ts=1425476378>
- August 2014 issue of the IBM Data Magazine, "**Automate Conversion to Native SQL Procedures**".
- <http://ibmdatamag.com/2014/08/automate-conversion-to-native-sql-procedures/>



Statement of Purpose

- **Tcorem** is focused on reducing your mainframe IT cost by reducing your CPU utilization through **automatic conversion of your DB2 External stored procedures to DB2 Native stored procedures**. We provide our customers with the highest quality of service and customer satisfaction. We do everything that we possibly can in order to meet your needs and expectations.
- **Tcorem** is a company which is dedicated to helping our customers reduce their mainframe total cost of ownership. **Our repeatable process and custom application code service offering, converts your DB2 COBOL DRDA/DDF external stored procedures to DB2 native SQL stored procedures**. Then, returns the converted DB2 native stored procedure to the organization for deployment using your favorite source code management tool



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Total Cost of Ownership Remediation Services

Services

- **Tcorem** turns your remote access DB2 DRDA/DDF transactions into zIIP redirect IT savings within months. We can perform the complete conversion process in one tenth the time of an average manual conversion process. We are experts in converting COBOL to SQL/PL
- If you have any of these inhibitors which prevent you from converting your COBOL DB2 external stored procedures to native procedures, we can help you.
 - Common Inhibitors
 - Limited Funding
 - Skilled Resources
 - Knowledge Experts
 - Limited Time



Solutions

- Our solution can be tailored for your individual needs whether you have one or one thousand COBOL stored procedures to be converted. We guarantee functional equivalent code when we do the full conversion.
- COBOL external stored procedure assessment.
- Conversion of COBOL logic to functionally equivalent SQL/PL. Deployment of native procedure to your selected source code management tool, including Data Studio.
- **Tcorem guarantees functionally equivalent code.**



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Who Are We?

- Nate has fifty years of IBM mainframe experience and has been selected as an IBM Champion for the past nine years. Currently, he is Executive Senior VP of **Tcorem** and President of Nate Murphy & Associates. Specializing in the conversion and testing of COBOL external stored procedures to DBA Native stored procedures. Nate Murphy has fifty years of mainframe innovative information technology experience.
- Elwin has 32 years of IBM mainframe experiences which includes 16 years of DB2 stored experience. He has created numerous External COBOL stored procedures and over 100 Native SQL stored procedures. He is an IBM certified DB2 v10 for zOS DBA.



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Our Process

- Tcorem uses a combination of manual and automated processes to convert your External COBOL stored procedures to Native SQL stored procedures. The process is based on two phases.
- Phase One is the assessment phase where we take your code components and use both the automated tools as well as our experience to assess your stored procedures to determine what the overall conversion complexity of the stored procedure is.
- Phase Two is the actual conversion phase where we take all of your code components and do any clean up to the code which needs to be done for the code to be processed by the conversion engine. Once the code has been converted we then ensure that the new stored procedure is ready for deployment.

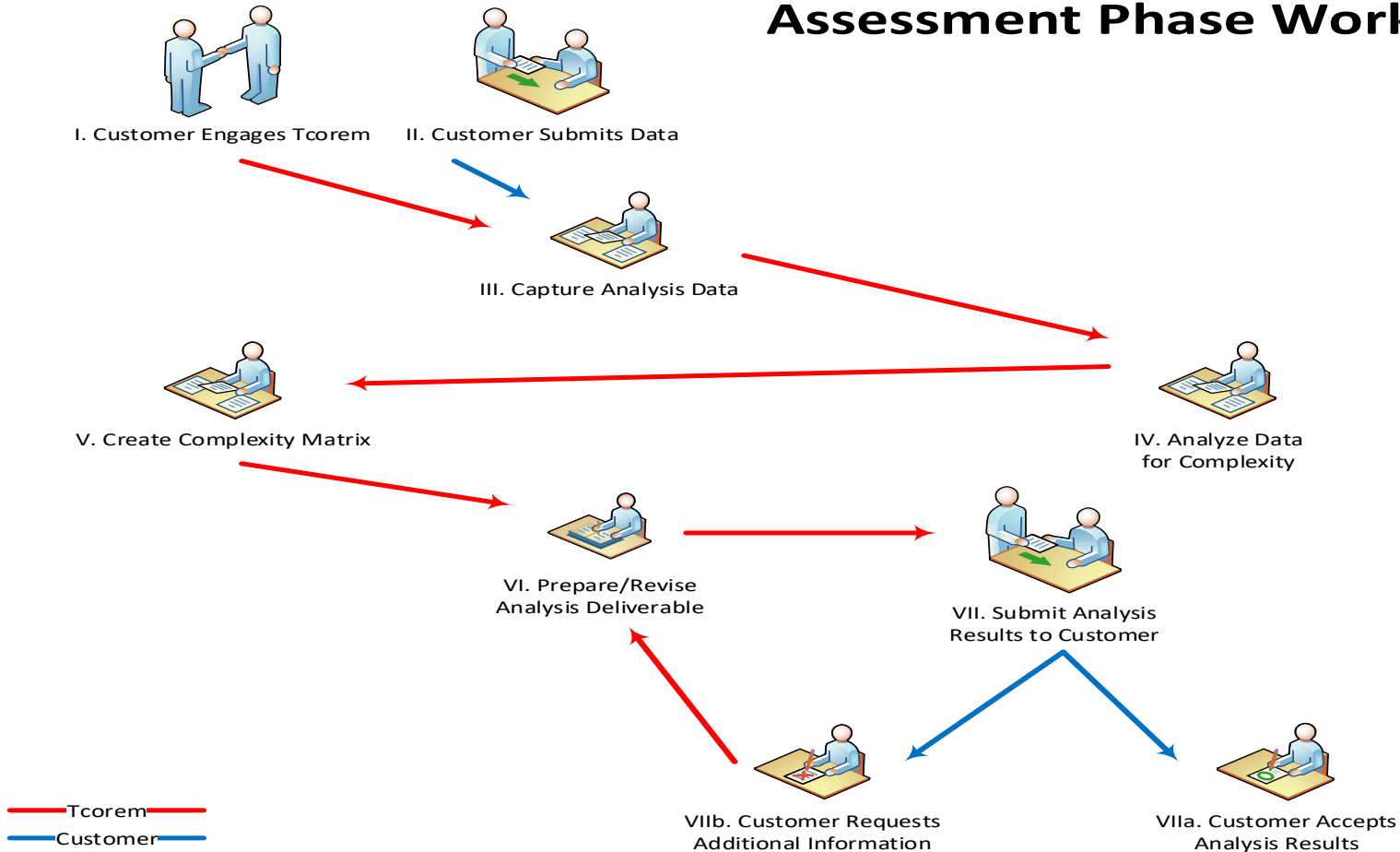


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Assessment Phase Workflow

Assessment Phase Workflow





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Detailed Assessment Report

Source Code Analysis Counts	
Program: Sample1	
Lines of Source Code	883
Source Code	650
Blank Lines	133
Comment Lines	71
Working Storage	
Source Code	222
Blank Lines	50
Comment Lines	7
Procedure Division	
Source Code	428
Blank Lines	83
Comment Lines	64
COBOL Verbs	
* Verb	2
ADD Verb	1
AND Verb	8
ELSE Verb	11
END-EVALUATE Verb	1
END-IF Verb	27
EVALUATE Verb	3
GIVING Verb	2
IF Verb	26
INITIALIZE Verb	3
IS Verb	1
MOVE Verb	62



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Summary Assessment Report

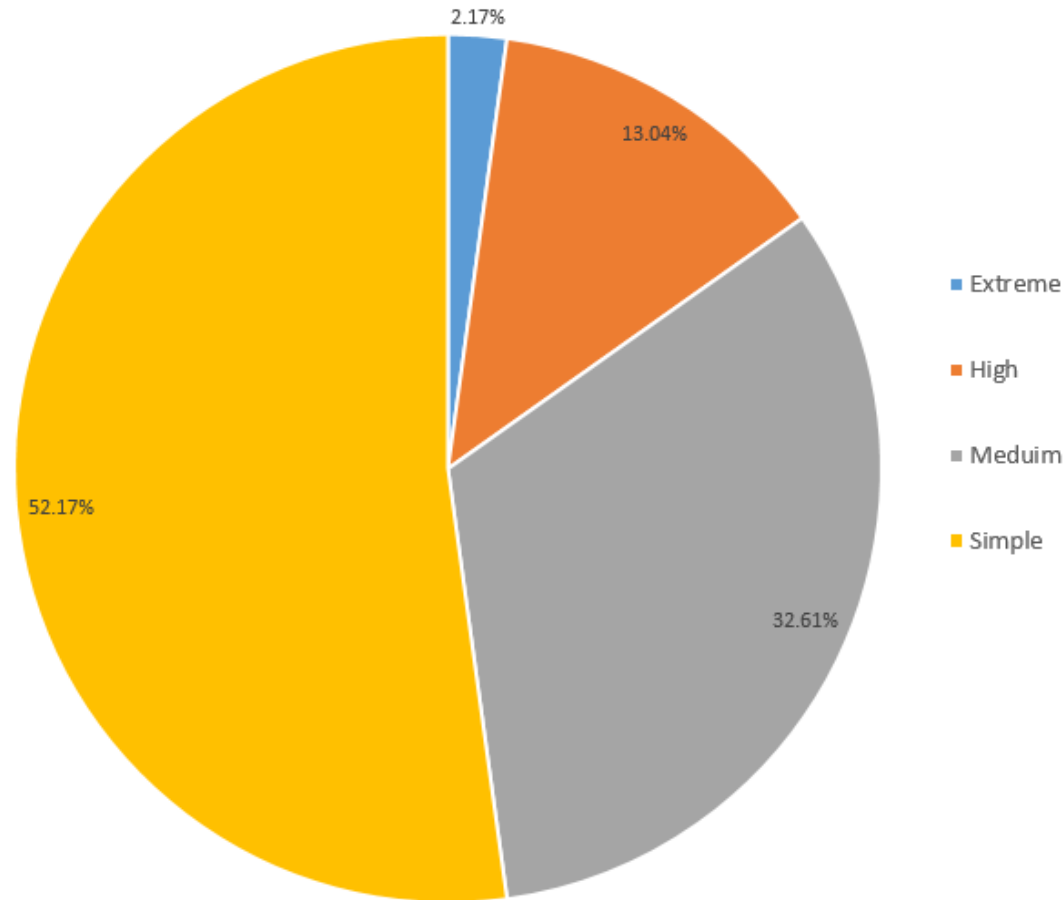
Category	Counts
Source Code Analysis Counts	
Number of Programs Scanned	46
Lines of Source Code	83686
Source Code	59173
Blank Lines	15668
Comment Lines	7018
Working Storage	
Source Code	21363
Blank Lines	9207
Comment Lines	690
Procedure Division	
Source Code	37810
Blank Lines	6461
Comment Lines	6328
COBOL Verbs	
- Verb	58
* Verb	170
+ Verb	45
ADD Verb	72
ALL Verb	3
ALSO Verb	119
AND Verb	752
CALL Verb	431
COMPUTE Verb	200
CORR Verb	138
DISPLAY Verb	2678
ELSE Verb	861
END-EVALUATE Verb	77
END-IF Verb	2173



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Complexity PIE Chart



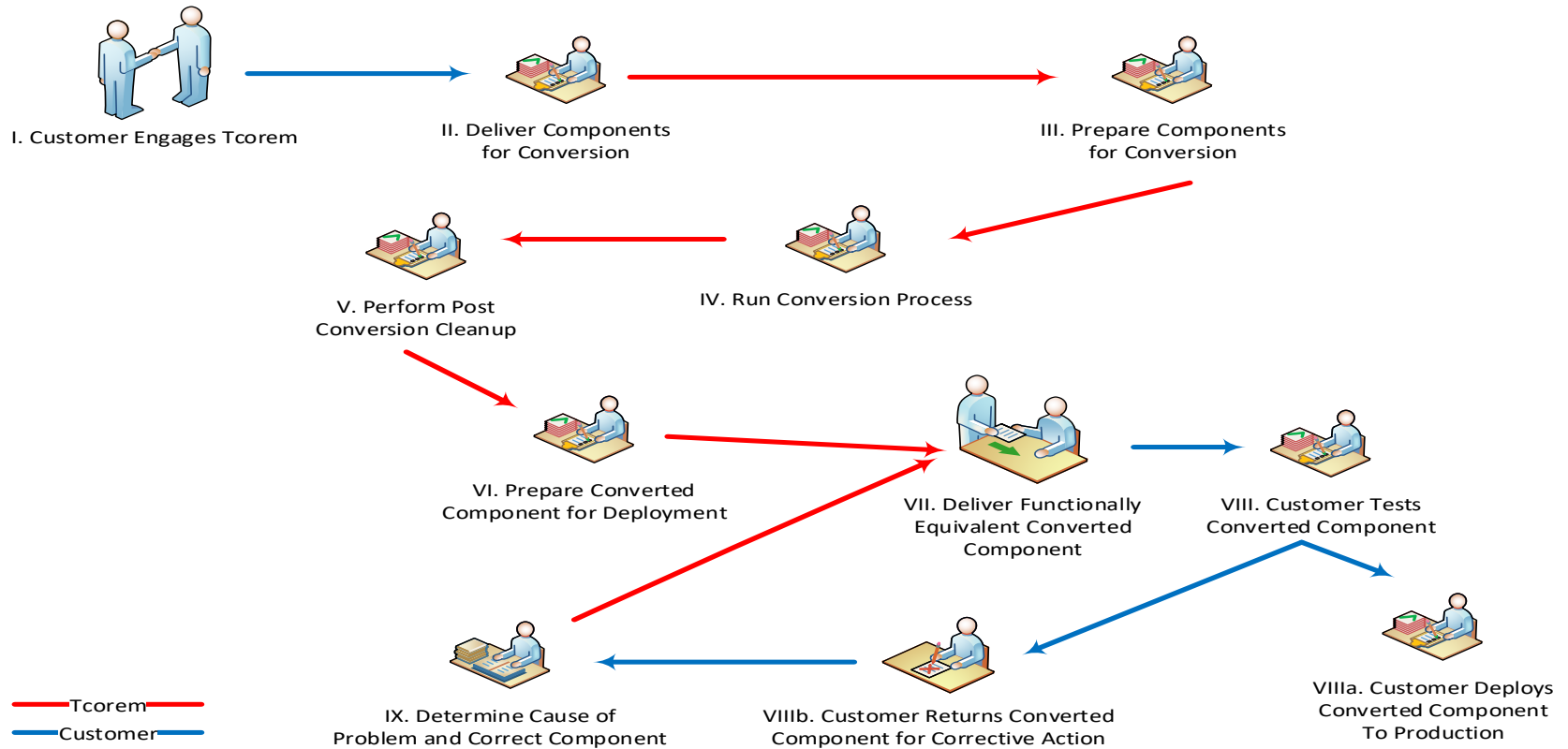


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Conversion Phase Workflow

Conversion Phase Workflow





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DB2 Stored Procedure Reference Documents

DB2 Stored Procedures Monitoring, Analysis and Tuning on System z by Charles Lewis

[DB2 for z/OS Distributed Data Facility Questions – and Answers](#) Robert Catterall

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Thank, You