What is Modernization on IBM i ?

Tim Rowe- timmr@us.ibm.com
Business Architect Application Development
Modernization on IBM i

- Who are your developers?
- What are the tools you use?
- How are you doing development today?
- Are you using the ‘best’ building blocks?
- Building your self? Leveraging Partners?
- How is the IBM i team helping you move into the future?
How do you avoid these types of mess ups??

- Do you have a Site plan
- Have a BEFORE blueprint
- Have an AFTER blueprint
- Understand the plan before you start
- Use the correct material
- Use the right Tools!!!!
- Right people

What's the Plan??
Joe Carpenter
Modernize Applications.....

• Move to ‘Modern Language’
• Self Documenting Code
• Testing anyone?
• Leverage Today’s Developers
• Transition from Monolithic to Modular
  – Impact Analysis
  – Get a Blueprint
  – Data Maps
• Interactive User Interfaces
• Connecting to the Data
• Agile development and deployment
Languages of IBM i

COBOL

G/C/C++

Modern RPG

JavaScript

Python

Rails

php
Modern RPG – Constant Transformation
RPG IV - A Modern Business Language

- Interoperability
  - Java
  - XML
  - SQL

- Readability
  - Free form
  - Blank lines
  - Comments

- Functionality
  - Procedures
  - Data areas
  - Data structures
  - More data types
  - Extended file support

- Modern Tools
  - RD i, RTC, ARCAD
  - Power Pack

```rpg
read file;          // Get next record
dow not %eof(file); // Keep looping with record
if %error;
  dspl 'The read failed';
  leave;
else;
  chain(n) name database data;
  time = hours * num_employees
       + overtime_saved;
  pos = %scan (',': name);
  name = %xlate(upper : lower : name);
  exsr handle_record;
  read file;
endif;
enddo;

begsr handle_record;
  eval(h) time = time + total_hours_array (empno);
  temp_hours = total_hours - excess_hours;
  record_transaction();
endsr;
```
ctl-opt bnddir('ACCRCV');

dcl-f custfile usage(*update);
dcl-ds custDs;
dcl-f report printer;

read custfile custDs;
dow not %eof;
   if dueDate > %date(); // overdue?
      sendOverdueNotice ();
      write reportFmt;
      exec sql insert :name, :duedate into 
         mylib/myfile;
   endif;
   read custfile custDs;
endo;

inlr = '1';

dcl-proc sendOverdueNotice;
   /copy invoices
      sendInvoice (custDs : IS_OVERDUE);
end-proc;
Modern RPG

- 8-80 Column restriction now gone
- Nested Data Structures
- %MIN & %MAX
- ALIGN(*FULL)

- New requirements
  - Continue to adopt object oriented principles in RPG
  - Deal with JSON in a Native manner
  - Simply dealing with arrays
  - RPG is driven by you...
    - RFE community is where you get a voice
    - And where we get work to do!!!

How is this changing the game?

Hear how Modern RPG and Tools allows a 23 year old developer to be success today!

http://bit.ly/1WhM7uT
How Do I Convert to Modern RPG ??

April 2017 Announce...

ARCAD Converter is now included in EES

ARCAD Converted for i - 5733-AC1

• Plugs into RDi
• Green Screen interface for MASS conversion
  • Convert your entire source file at once

Input Specs and Data Structures -> Declarations
Creates Case Statements

G21600 IN2SR();
G21700 //
G21800 Deli ؟EXIT = ؟TRUE;
G21900 //
G22000 Write MSGCTL;
G22100 //
G22200 Exfmt FRSPUP;
G22300 //
G22400 Select;
G22500 // When KEY = ؟F0;
G22600 @FRSPUR();
G22700 //
G22800 When KEY = ؟F3;
G22900 @FRSR();
G23000 //
G23100 When KEY = ؟F4;
G23200 @FRSSR();
G23300 //
G23400 When KEY = ؟F5;
G23500 @FRSRS();
G23600 //
G23700 When KEY = ؟F6;
G23800 @FR6SR();
G23900 //
G24000 When KEY = ؟F7;
G24100 @FR7SR();
G24200 //
G24300 When KEY = ؟F8;
G24400 @FR8SR();
G24500 //
G24600 When KEY = ؟F9;
G24700 @FR9SR();
G24800 //
G24900 When KEY = ؟F12;
G25000 @FRLSR();
G25100 //
G25200 Other:
G25300 @ERACK();
G25400 //
G25500 EndDI;
G25600 //
G25700 If KEY = ؟F6
G25800 and ؟INSO = ؟OFF;
G25900 @FR6SR();
G26000 EndIf;
G26100 //
G26200 If KEY = ؟F10
G26300 and ؟INLR = ؟ON;
G26400 @010SR();
G26500 //
G26600 EndIf;
G26700 //
G26800 IN2SR BEGSR;
Subroutines converted to Procedures

Dcl-Proc INZSR;  
  //  
  // *IN39 = 'O';  
  // *IN40 = 'O';  
  // *IN44 = 'O';  
  // *IN51 = 'O';  
  // *IN52 = 'O';  
  // *IN53 = 'O';  
  // *IN54 = 'O';  
  // *IN55 = 'O';  
  // *IN56 = 'O';  
  //  
  // %Subst(MSGID:7:1) = '';  
  // MSGOTA = *Blanks;  
  // MSGQUE = *PGM;  
  //  
  //  
  // ORDNUM = PORDER;  
  //  
  // Chain ORDNUM ORDNAME;  
  // *IN44 = not *Found;  
  //  
  // FILDPK = DEPART;  
  // DOFPR = %Dec(=Wlate(' ','0'):FILYP):4(0);  
  // DOPROM = %Dec(=Wlate(' ','0'):FILMP):2(0);  
  // DOFDAY = %Dec(=Wlate(' ','0'):FILDO):2(0);  
  //  
  // CUSTKY = CNAME;  
  // CUSNAM = CUSTNM;  
  //  
  // CLASSK = CLASS;  
  //  
  // COSFIR = 'L';  
  // COBANK = 'B';  
  // COSEC = 'X';  

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<td>025200</td>
<td>C</td>
<td>INZSR</td>
<td>BEGSR</td>
<td>* SET OUTP TC SCRE</td>
<td></td>
</tr>
<tr>
<td>025300</td>
<td>C*</td>
<td>SETOF</td>
<td></td>
<td></td>
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<tr>
<td>025400</td>
<td>C</td>
<td>SETOF</td>
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<td>C</td>
<td>SETOF</td>
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<tr>
<td>025800</td>
<td>C*</td>
<td>MOVE '. '</td>
<td>MSGID 7</td>
<td></td>
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<tr>
<td>025900</td>
<td>C</td>
<td>MOVE *BANKS</td>
<td>MSGOTA 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>026000</td>
<td>C</td>
<td>MOVE *PGM</td>
<td>MSGQUE 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>026100</td>
<td>C*</td>
<td>MOVE QFALSE</td>
<td>QEXIT 1</td>
<td></td>
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</tr>
<tr>
<td>026200</td>
<td>C</td>
<td>MOVE QPGM</td>
<td>PGM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>026300</td>
<td>C*</td>
<td>Z-ADDORDER</td>
<td>ORDNUM</td>
<td>ACTIV</td>
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<tr>
<td>026400</td>
<td>C</td>
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<td>CHAIN/ORDNAME</td>
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<td>C</td>
<td>ORDNUM</td>
<td>ORDNAME</td>
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<td>FILDPK</td>
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<td>MOVE CNAME</td>
<td>CUSTKY</td>
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<td>CUSTNM</td>
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<td>027200</td>
<td>C*</td>
<td>MOVE CLASS</td>
<td>CLASS</td>
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<td>MOVE ' '</td>
<td>COFIR</td>
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<td>COBUS</td>
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<td>C</td>
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<td>COSEC</td>
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<td>C</td>
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<td>IPEQ '1'</td>
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<td>IPEQ '2'</td>
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<td>IPEQ '3'</td>
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</tbody>
</table>
Latest in SQL

New in Apr 2016

Updates from the original

Many of the same expert Authors, plus a few New ones!

Modern RPG

New in Dec 2016

Updated from the original book from 2000

Many of the same expert Authors, plus a few New ones!

Modern IBM i Application from the Database up to the User Interface and Everything in Between

New in June 2014

Many Experts from the IBM i Community


22,000 + Downloads!!!!
Development tools....

Tried and True, Yes but also SLOW, OLD, No new features
Rational Developer for i

- Modern
- Integrated
- Analysis
- Debugger
- Visual

- Supports RPG, COBOL, CL, C, C++, SQL, DDM
Developer Productivity

- Return on Investment
- Better able to respond to the needs of the business
- Higher quality
- Positioned to adopt new talent

20% ➔ 50% Productivity improvement
RDi Latest and Greatest 9.5.1

SSO
Kerbrose

Run SQL Scripts
Format SQL
Visual Explain

RPGILE Outline
O-Spec I-Spec Indicators Unreferenced

Synchronize IFS Projects
Comments

© 2016, 2017 IBM Corporation
RDi Latest and Greatest 9.5.1.2

- Fix pack, so easy to install
- Nested Data Structures
- %MIN, %MAX
- Align(*FULL)
- Trim Leading spaces on line join ALT-J
- Kerberos Updates
- Content Assist updates
- Outline view updates
Rational Developer for i

RDi 9.5.1.2
Delivers Name Refactoring
Renaming

Any fool can write code a computer can understand.... Good programmers write code that a human can understand.

*Martin Fowler*
Names

• Names are critical to
  – Revealing the programmer’s intent
  – Provides meaning
  – Making the code read like prose
  – Maintainability
• Changing code without changing the function
• Since the tool makes renaming easy and error-free there is no excuse to tolerate cryptic or out-of-date names any more
• It works within fixed, free and fully free (**FREE) source
• Better then Find -> Replace
### Rename Refactoring

#### Original Source

<table>
<thead>
<tr>
<th>dcl-s name int(10);</th>
<th>dcl-s label int(10);</th>
</tr>
</thead>
<tbody>
<tr>
<td>dcl-s arr int(10)</td>
<td>dcl-s arr int(10)</td>
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</tr>
<tr>
<td>dcl-f file disk(20)</td>
<td>dcl-f file disk(20)</td>
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<tr>
<td>usage(*input : *output);</td>
<td>usage(*input : *output);</td>
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<tr>
<td>dcl-ds qual qualified;</td>
<td>dcl-ds qual qualified;</td>
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<tr>
<td>name char(10) dim(3);</td>
<td>name char(10) dim(3);</td>
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<tr>
<td>end-ds;</td>
<td>end-ds;</td>
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<tr>
<td>I 1 4 0name</td>
<td>I 1 4 0label</td>
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<tr>
<td>x = name;</td>
<td>x = label;</td>
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<tr>
<td>x = arr(name);</td>
<td>x = arr(label);</td>
</tr>
<tr>
<td>qual.name(name) = 'a';</td>
<td>qual.name(label) = 'a';</td>
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<td>C eval name = arr(name);</td>
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</table>

#### Refactored Source

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</table>
Tools for Program Understanding

ARCAD – Observer
FRESCHE – X-Analysis

Why a Tool for Analysis?

- Rapid analysis for hot fixes
- Application Change Studies (cost estimation)
- Redesign/re-architecting/SOA
- Extraction of business rules
- Application modernization
- Skill transfer
  - Help new people learn the application
- Generation of documentation required by regulatory constraints

Provides the Blueprint
Time to start understanding your code
April 2017 Announce...

ARCAD Observer is now included in EES
ARCAD Observer for i - 5733-AO1

• Plugs into RDi

ARCAD-Observer
Application analysis

Summarize application components in an easy to digest way

- Diagrams: I/O, database relationship, chain
  - Observe and analyze applications with diagrams
- Flowcharts
  - Observe and analyze applications with flowcharts
- Macroscopic views
  - Drill down to all dependencies between components
- Source code analyzer
  - Enhance source code graphically
- List manager
  - Analyze custom groups of components
- Documenter
  - Automatically generate diagrams, documentation & HTML
- Eclipse based RDi Plug-in
  - Accessible directly from RDi
- Ready for Rational
  - IBM validated integration with RDi

More than 50% of developers time is spent understanding application's

An immediate solution for missing or obsolete documentation
Data & Data Access
Why Modernize Your Reporting Environment

- Turn DATA into INTELLIGENCE
- Delivered at the right time, in the right formats
- Take advantage of SQL Capabilities
- Document the database, and standardize on data meaning (single version of the truth)

- Get I/T out of the Report Writing Business
  - With self service reporting solutions
- Eliminate redundancy
- Adapt more quickly to changes in the operational systems/databases
- Deploy reports in a variety of highly intuitive ways
  - Mobile, Excel, Dashboards, OLAP
- Improve the perception of the “AS/400”
Connections

There \rightarrow Devices \rightarrow Applications \rightarrow Here
You have no upcoming trips.

Add a booking
API Definition

Application Programming Interface
API Definition

Application programming interface

From Wikipedia, the free encyclopedia

"API" redirects here. For other uses, see API (disambiguation).

In computer programming, an Application Programming Interface (API) is a set of subroutine definitions, protocols, and tools for building application software. In general terms, it is a set of clearly defined methods of communication between various software components. A good API makes it easier to develop a computer program by providing all the building blocks, which are then put together by the programmer. An API may be for a web-based system, operating system, database system, computer hardware or software library. An API specification can take many forms, but often includes specifications for routines, data structures, object classes, variables or remote calls. POSIX, Microsoft Windows API, the C++ Standard Template Library and Java APIs are examples of different forms of APIs. Documentation for the API is usually provided to facilitate usage.
APIs - Simple

Simple way to connect endpoints. Send a request and receive a response.
Web service client/server flow does not change

- Create and Host APIs – IWS Server
  - SOAP Web Services (JAX-WS)
  - REST Web Services (JAX-RS)
- Call Web Services from your native RPG/COBOL - IWS Client
  [http://www.ibm.com/systems/i/software/iws/]
How do you access IBM i Information?

**Past**
- Write code to call
  - CL Commands
  - System APIs
- Write more code to sort, filter, find what you are after

**Today with SQL Services**
- With a single SQL statement
  - Retrieve information
  - Leveraging the power of SQL
    - Sort, Filter, find what you are after
Built in DB2 Services – Use SQL to get info from the system!

Who’s password is about to expire

```
SELECT * from qsys2.user_info where status = '*ENABLED' AND DATE_PASSWORD_EXPIRES BETWEEN CURRENT TIMESTAMP AND CURRENT TIMESTAMP + 7 DAYS;
```

Examples included in ACS

http://ibm.biz/DB2foriServices
XML Service

Easy access to IBM i data and resources from PHP
(similar to IBM ToolBox for Java)

- DB2 for i – SQL and Native
- Program call
- Procedure call
- Data Area
- Data Queue
- Message Queue
- Commands
- System values
- Spool files

Some Key Open Source Technologies

- PHP
- Python
- Node.js
- Git
- Orion
What are our Customers Doing with it?

- New ways to leverage their data
- Modern UI
- Opening new Markets or expanding existing

---

Scotsburn
[Link](https://scotsburn.com/)

Wenger
[Link](https://www.wengercorp.com/)

HT Bendix A/s
[Link](http://www.htbendix.dk/#)

KTA
[Link](https://www.ksturnpike.com/)

Allied Refrigeration
[Link](https://is.alliedrefrigeration.com/arhome.php)
DevOps

Helping development meet the needs of the business at the speed of business
What is DevOps

Accelerate software delivery – for faster time to value

Balance speed, cost, quality and risk for increased capacity to innovate

Reduce time to customer feedback – for improved customer experience

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DevOps

Think
Conceptualization, refinement, and prioritization of capabilities

Learn
Continuously learn based on outcomes from experiments

Code
Generation, enhancement, optimization and testing of features

Culture
Foundational values and principles

Manage
Ongoing monitoring, support, and recovery of offerings

Deliver
Automated production and delivery of offerings

Run
Services, options, and capabilities required to run in the Cloud

To learn more visit: https://www.ibm.com/devops/method
The Systems is NOT Old....its what you have choosen to do with the system that defines its ‘Age’

Art of the Possible
IBM i 7.1 Concerns

- IBM i 7.1 has been out for 7 years
- Many parts are getting very long in the tooth...

SMB1

SSL/TLS
IBM i 7.1 Concerns

- **Java**
  - Default version of Java is Java 6
  - Just announced - Java 6 will reach EOL Dec 2017
    - No more fixes
    - No more security patches
    - Only option is to move to newer version of Java

- Oracle ended Java 6 (for premium customers) Dec 2016
- IBM went an additional year with support
IBM i 7.1 Concerns

• Apache
  • DG1 – HTTP Server Powered by Apache
    • Ships Apache 2.2

  • Apache Foundation announced EOL for 2.2 for Dec 2017

  • No more security patches available
    • This applies even if you purchase extended service

  • Only option – Move to new IBM i OS
IBM i 7.1 Concerns

- **SMB1**
  - Recent US-CERT and Microsoft advisories recommend disabling SMB1
  - Internal MAD vulnerability scan failures based on the advisories
  - Microsoft plans to uninstall SMB1 in future builds of Windows 10

- This effects
  - QNTC
  - NetServer

- Resolution – Move to newer IBM i OS release
System SSL - New in 7.2 (PTFs back to 7.1)

• Transport Layer Security version 1.1 & 1.2 protocol (TLSv1.1 and TLSv1.2) RFC 4346 & RFC 5246
  – SHA2 support

**WARNING:** Payment Card Industry (PCI) will require TLS 1.1 or TLS 1.2 in June, 2018.
IBM i 6.1 does not support TLS 1.1 or TLS 1.2.

• TLS1.2 is the current “gold” standard
  • PCI requirement in June 2018 (TLS 1.1 or TLS 1.2)
  • TLS 1.1 & 1.2 support exists in 7.1 and 7.2
  • IBM i 6.1 and earlier will **not meet PCI requirements** in 2018
  • Latest support has been PTFed to 7.1

**NOTE:** All versions of SSL and TLS 1.0 have been deemed unsecure and should never be used!
Questions and Answers
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