IBM i Application Modernization Thoughts

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Architect Application Development IBM i

Development Paradigms of Today
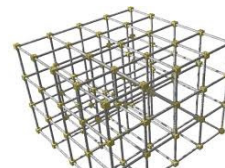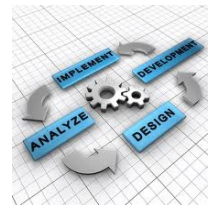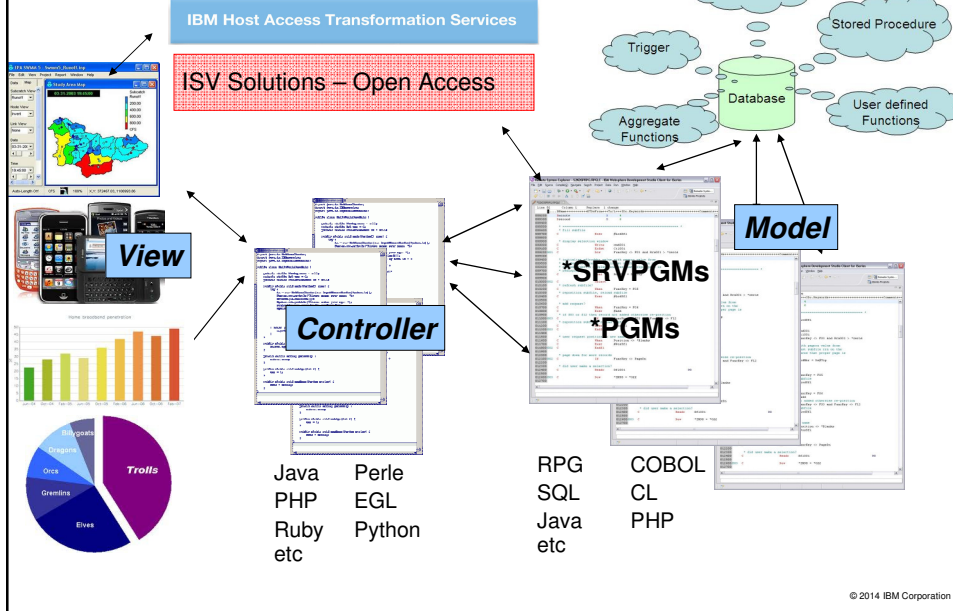
- **Graphical User Experiences**
  - Grown from GUIs to Experiences
  - Mobile device enablement is key

- **Agile Development**
  - Work in highly collaborative groups
  - Time line is strict
  - Small adaptive modules

- **Framework Development**
  - Component based
  - Model – View – Controller
  - Services Orientation
  - Componentized code
  - Business based
  - Distributed function

Mixed Environments & Re-facing

IBM Host Access Transformation Services

ISV Solutions – Open Access

User defined Types

Stored Procedure

Trigger

Database

Aggregate Functions

User defined Functions

View

Controller

Model

*SRVPGMs

*PGMs

Java   Perle
PHP   EGL
Ruby   Python
etc

RPG   COBOL
SQL   CL
Java   PHP
etc

Modernization

User Experience

Modern Database Design

Flexible Code

WAS
SOA
WEB   SQL
Open Access   Ruby
COBOL
RPG   Java

Environment and Tools

Industry Trends – Connectivity Anywhere

Application Service

Application Service

Application Service

Application Service

Connections

Services Oriented
– Modular
– Reusable
– Loosely Coupled
– Standards based

Application Service

Application Service

Application Service
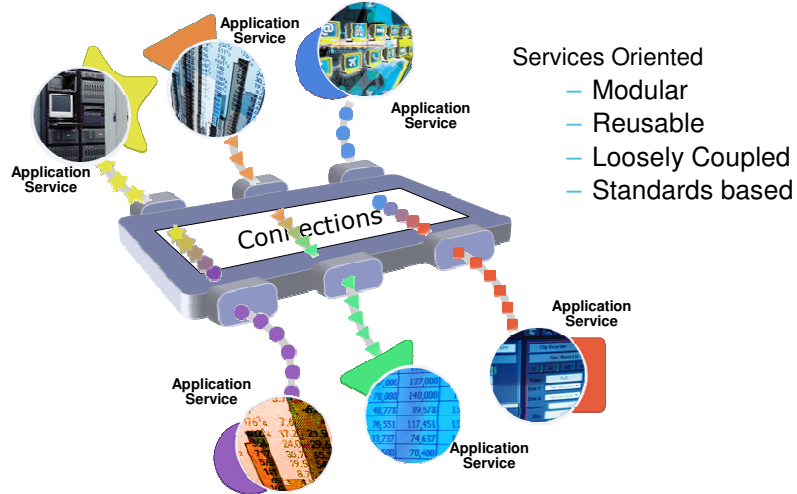
Industry Trends - Mobile Anyone ?

Application Development Strategy for IBM i

Compilers &
Languages

Common development and management
tools across operating systems and
languages

Embrace Open
Source Solutions

Integrate web and development
technologies into IBM i

Include vendor tools as
necessary

IBM i 7.1 Technology Refresh 5 - Highlights

- Self-managing value proposition of **DB2 for IBM i**
  extended with improvements for better performance and
  usability.
- Extract maximum value from POWER7 with **DB2
  Symmetric Multiprocessing**
- **IBM SmartCloud Entry** available for IBM i

  - Manage IBM i with significant performance and usability
    updates of the Web based **IBM Navigator for i**
  - **XML Service** provides a language independent method to
    access native IBM i objects either local or remote
  - New **Enterprise Functions in BRMS** to manage and
    automate networked BRMS installations

- Access IBM i native data in Java based mobile applications by
  leveraging the new small format **JTOpen Lite**
- Latest Releases of Selected **IBM Software Group Offerings**
  available on IBM i
- **New I/O Device** support including USB-attached tape drives
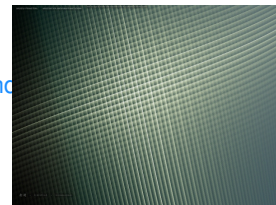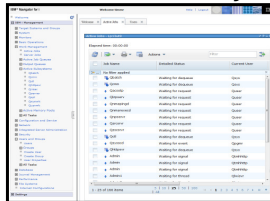
IBM i 7.1 Technology Refresh 6 - Highlights

- Enhancing the value proposition of **DB2 for i** by extending SQL capabilities, improving performance and enhancing data center manageability
- Support for latest **POWER7+ Express Servers**
- Use of **USB Flash Drives** now supported by IBM i
- **New Mobile Solutions**
  – **Zend Server for i Version 6** provides mobile application development and runtime
  – **IBM Mobile Database** solution uses DB2 for i as data source
  – Statement of Direction for **IBM Lotus Notes Traveler** and **IBM Connections** availability
- **IBM i Secure Sockets Layer (System SSL)** supports TLSv1.1 and TLSv1.2 and Online Certificate Status Protocol (OCSP)
- **PowerHA SystemMirror for i** adds support for additional storage devices, including IBM SAN Volume Controller (SVC) and IBM Storwize V7000, V3700 and V3500
- **IBM Systems Director** error detection and reporting

IBM i 7.1 Technology Refresh 7 - Highlights

- Self-managing value proposition of **DB2 for IBM i** extended with improvements for better performance and usability.
  – Very Large Database - DB2 for i gets bigger and better
  – Advanced Security controls using DB2 for i
  – DB2 for i as a solution platform

- RPG IV includes more free format **options for** developers, allowing them to embrace RPG IV as valuable business language
  – Provides attractive option for companies looking for new programmers

- **Java 1.7.1** now available
  – uses the latest Java 7 class libraries and runs in the new faster runtime engine

- **Application Runtime Expert** enhancements
  – now includes ability to schedule an automated verification on 1 or more systems

- Support has been extended to include new and enhanced I/O hardware options
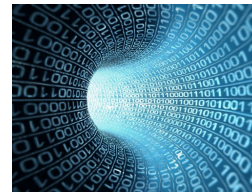
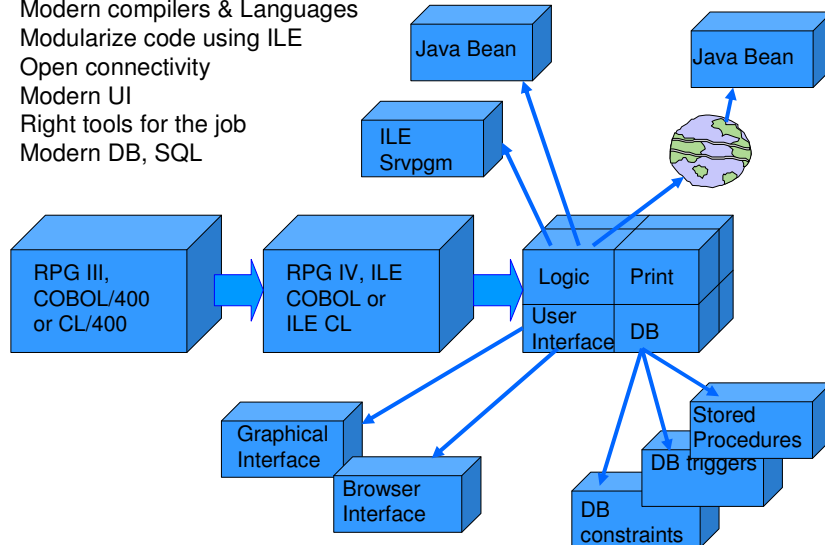## Modernizing an Application; Things to consider

- What are the Business Objectives for this application?
- Does the current application reflect the business objectives?
  - Yes? No?
  - If yes, how much?
  - Is the application able to be updated?
- Who is the target audience
- Longevity of the solution
- Are there additional requirements from the users of the application?
- What is the state of the database?
- Need additional connection points?
- What is your budget?
- What is your development skill set?
- What are the UI requirements?
  - Sub-sec response time?
  - Type ahead ? Data entry ?
  - Mobile ? Web?
  - Internal users? External users?

IT must optimize for a diverse set of workloads

Modernization of Applications and Data

- Modern compilers & Languages
- Modularize code using ILE
- Open connectivity
- Modern UI
- Right tools for the job
- Modern DB, SQL

Java Bean

Java Bean

ILE Srvpgm

RPG III, COBOL/400 or CL/400

RPG IV, ILE COBOL or ILE CL

Logic | Print
User Interface | DB

Graphical Interface

Browser Interface

Stored Procedures

DB triggers

DB constraints

RPG IV - A Modern Business Language

Primary goals for RPG IV
- Interoperability
  - Java
  - XML
  - SQL
- Readability
  - Free form
  - Blank lines
  - Comments
- Functionality
  - Procedures
  - Data areas
  - Data structures
  - More data types
  - Extended file support
- Modern tooling
  - RD i

```
read  file;              // Get next record
   dow not %eof(file);      // Keep looping with record
      if %error;
          dsply '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;
```
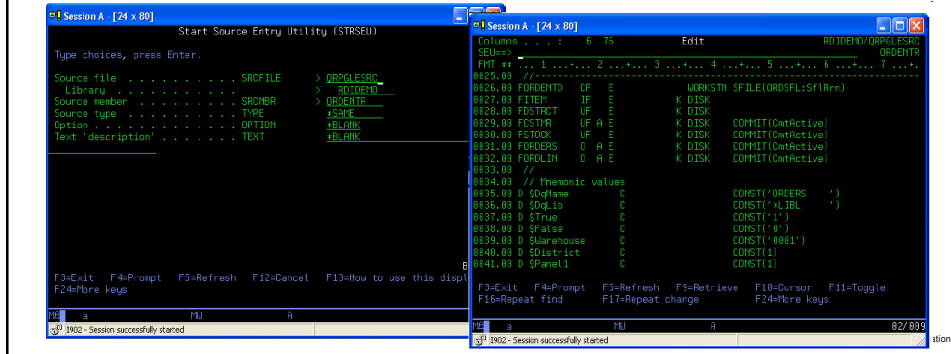
A Brief History of Computer Time

- In the beginning there was the punch card

- In those days computer time was expensive and people time was cheap and so column sensitive computer languages ruled the day. 80 columns was enough for everybody.
- With time we developed 80 column terminals and life was much better.
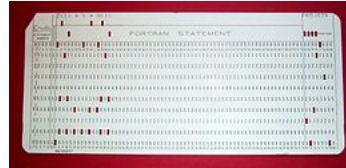
Personal Computer

- Great leap forward with color, windows and mice.

- RPG was easier to understand and edit, but it remain locked in columns.

- Nesting was still difficult to see
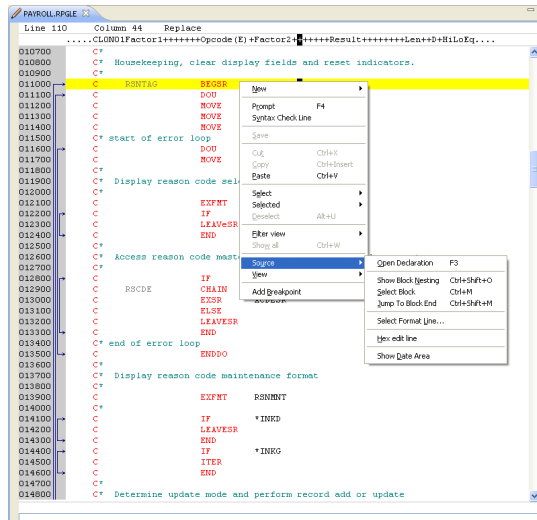
Another big step forward for RPG – a totally free-form program

```
ctl-opt bnddir('ACCRCV');

dcl-f custfile usage(*update);
dcl-ds custDs likerec(custRec);
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;
enddo;
*inlr = '1';

dcl-proc sendOverdueNotice;
   sendInvoice (custDs : %date());
 end-proc;
```

RPG programmers will
  find this new syntax
  easy to learn

Non-RPG programmers will
  find this new syntax
  <u>much</u> easier to learn
  than fixed form

How far RPG has come

Let's take a look at
the last 25 years
of RPG syntax

RPG III (OPM RPG) System-38 – V2R3

```
FCUSTFILEIF  E                    DISK
FREPORT   O  E                    PRINTER
ICUSTDS    E DSCUSTFILE
 /COPY GETCURDAT
 /COPY INVOICE
C                    READ CUSTFILE
C          *INLR     DOWNE*ON
C          DUEDAT    IFGT CURDAT
C                    EXSR SNOVDU
C                    WRITEREPORTFM
C/EXEC SQL INSERT :NAME, :DUEDATE INTO
C+         MYLIB/MYFILE
C/END-EXEC
C                    ENDIF
C                    READ CUSTFILE                    LR
C                    ENDDO
C*
C          SNOVDU    BEGSR
C                    CALL 'SNDINVCE'
C                    PARM         CUSTDS
C                    PARM ISOVDU  OVERDU 10
C                    ENDSR
```

> Limit of 6 character
> names. "Send overdue
> notice" = SNOVDU
>
> All code is upper
> case

V3R1

```
H bnddir('ACCRCV') dftactgrp(*no)
Fcustfile  uf  e           disk
Freport    o   e           printer
D custDs       e ds            extname(custfile)
D today        s          d   datfmt(*iso)
 /copy invoices
C                  time              today
C                  read      custfile
C                  dow       not %eof
C                  if        dueDate > today
C                  exsr      sendOvrNtc
C                  read      custfile
C                  write     reportFmt
C/exec sql insert :name, :duedate into
C+         mylib/myfile
C/end-exec
C                  endif
C                  enddo
C                  eval      *inlr = '1'

C    sndOvrNtc     begsr
C                  call      'SNDINVCE'
C                  parm                custDs
C                  parm      IS_OVERDUE  overdue     10
C                  endsr
```

> Mixed case
>
> Up to 10 characters
> for names. "Send
> overdue notice" =
> SendOvrNtc
>
> Date/time support

V3R2 – V4R4

```
H bnddir('ACCRCV') dftactgrp(*no)
Fcustfile   uf   e            disk
Freport     o    e            printer
D custDs        e ds                  extname(custfile)
D today          s              d    datfmt(*iso)
D sendOverdueNotice...
D                pr
C                    time                      today
C                    read       custfile
C                    dow        not %eof
C                    if         dueDate > today
C                    callp      sendOverdueNotice (custDs)
C                    write      reportFmt
C/exec sql insert :name, :duedate into
C+              mylib/myfile
C/end-exec
C                    endif
C                    read       custfile
C                    enddo
C                    eval       *inlr = '1'

P sendOverdueNotice...
P                b
 ...
```

> **Subprocedures**
>
> **Long names. "Send overdue notice" = SendOverdueNotice**

V5R1 – V5R2

```
H bnddir('ACCRCV') dftactgrp(*no)
Fcustfile   uf   e            disk
Freport     o    e            printer
D custDs          ds                  extname(custfile)

D sendOverdueNotice...
D                pr
 /free
    read custfile custDs;
    dow not %eof;
       if dueDate > %date(); // overdue?
          sendOverdueNotice ();
          write reportFmt;
 /end-free
C/exec sql insert :name, :duedate into
C+             mylib/myfile
C/end-exec
 /free
       endif;
       read custfile custDs;
    enddo;
    *inlr = '1';
 /end-free
...
```

> **Free form calculations**
>
> **Indentation!**
>
> **Many new built-in functions**

V5R3 – 7.1

```
H bnddir('ACCRCV') dftactgrp(*no)
Fcustfile   uf  e                disk
Freport     o   e                printer
D custDs        e ds                extname(custfile)
D sendOverdueNotice...
D               pr
/free
    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;
    enddo;
    *inlr = '1';
 /end-free

P sendOverdueNotice...
P               b
 /copy invoices
...
```

> **Free-form SQL**

7.1 TR7, and RDi 9.0.1

```
 ctl-opt bnddir('ACCRCV');

 dcl-f custfile usage(*update);
 dcl-ds custDs likerec(custRec);
 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;
 enddo;
 inlr = '1';

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

> **No /FREE, /END-FREE**
>
> **All free-form statements**
>
> **Better colorization**
>   **options in the editor**

What is wrong with fixed-form code?

- Most programmers today have never seen fixed form code

- When they see RPG code like this, it looks like gibberish

```
H bnddir('ACCRCV') dftactgrp(*no)
Fcustfile  uf   e            disk
Freport    o    e            printer
```

- Requires a Legacy Trained RPG Programmer

- Give the impression that IBM i is OLD

What will an all-free RPG mean for IBM i ?

Non-RPG programmers will be able to learn RPG much more easily

- Fewer "secret codes" to remember ("E in column 19 means externally-described")

- Better token-colorization in the RDI editor, allowing programmers to have the same look-and-feel for RPG code as for other languages like Java or PHP

- New programmers will only have to learn how to use RPG, without having to struggle with how it is coded

- Modern Tools + Modern Language Syntax = Positive Future

How does this help the programmer?

- Indented code is more maintainable

- Removal of many frustrations:

  - /FREE and /END-FREE in every procedure

  - Two lines for many definitions in fixed-form

Before →
```
D getNextCustomer...
D                    pr
```

After →
```
dcl-pr getNextCustomer;
```

  - Insufficient room in D-spec keywords for long strings

Before →
```
D HSSFCellStyle    c
D                               'org.apache.poi.hssf.-
D                               usermodel.HSSFCellStyle'
```

After →
```
dcl-c HSSFCellStyle
'org.apache.poi.hssf.usermodel.HSSFCellStyle';
```

  - **Support for BOTH fixed and free format**

Summary

We several goals when designing the new free-form syntax

- Easy for non-RPG programmers to learn

- Easy for existing RPG programmers to learn

- RPG, a Modern Business Language

We hope we have accomplished those goals!

ARCAD-Converter : Application Modernization
Convert to Free Format RPG

NEW

Help the latest generation of developers to manage and maintain your applications by converting to Free Format RPG
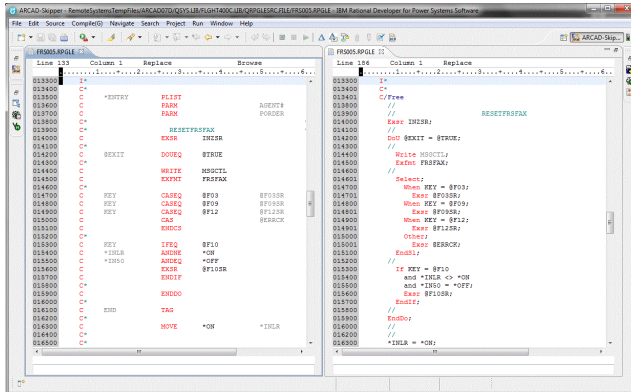
- Rational Developer for i plug-in
- On-demand or bulk conversion
- Support for the latest compiler specs (C, H, F, D and P)

RPG Toolbox - Modernize your RPG programs

RPG Toolbox will greatly improve the productivity of developers who write and maintain software on the IBM i (iSeries). The Toolbox allows you to modernize your RPG programs, write applications faster and maintain source code more effectively.
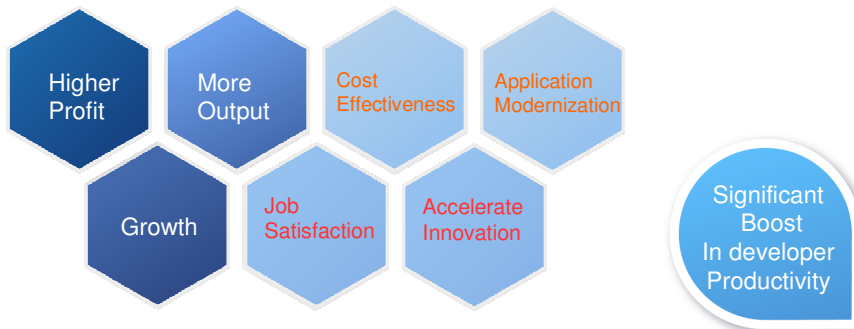
Now Available! Also convert H, F, D and P specifications to Totally Free Form RPG.

Tooling
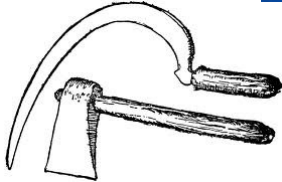
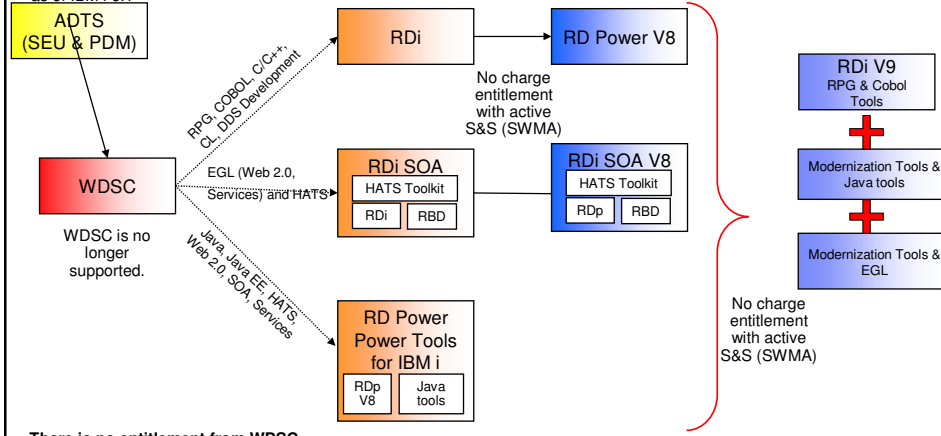## Productivity & Innovation – Why its Important

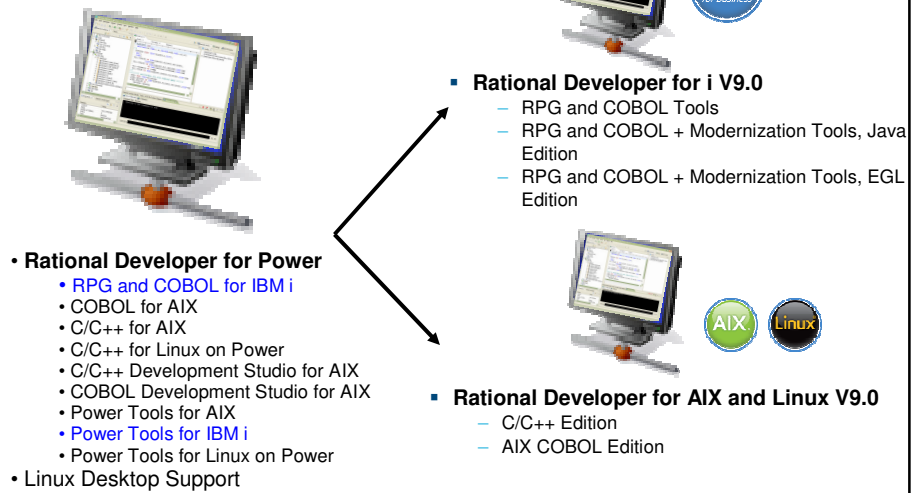Productivity: The measure of output from a process, such as output per labor-hour.

Higher Profit

More Output

Cost Effectiveness

Application Modernization

Growth

Job Satisfaction

Accelerate Innovation

Significant Boost In developer Productivity

A brief history of development tools for IBM i …

ADTS is supported, but no longer being updated or enhanced as of IBM i 6.1

ADTS
(SEU & PDM)
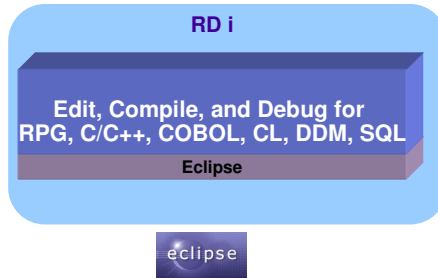
RPG, COBOL, C/C++, CL, DDS Development

EGL (Web 2.0, Services) and HATS

Java, Java EE, HATS, Web 2.0, SOA, Services

WDSC

WDSC is no longer supported.

RDi

RD Power V8

No charge entitlement with active S&S (SWMA)

RDi SOA
- HATS Toolkit
- RDi
- RBD

RDi SOA V8
- HATS Toolkit
- RDp
- RBD

RD Power Power Tools for IBM i
- RDp V8
- Java tools

RDi V9
RPG & Cobol Tools

+

Modernization Tools & Java tools

+

Modernization Tools & EGL

No charge entitlement with active S&S (SWMA)

There is no entitlement from WDSC to RDi, RDi SOA, RD Power or RAD.

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Rational Development Tools
New Names, New Packaging

- **Rational Developer for Power**
  - RPG and COBOL for IBM i
  - COBOL for AIX
  - C/C++ for AIX
  - C/C++ for Linux on Power
  - C/C++ Development Studio for AIX
  - COBOL Development Studio for AIX
  - Power Tools for AIX
  - Power Tools for IBM i
  - Power Tools for Linux on Power
- Linux Desktop Support

- **Rational Developer for i V9.0**
  - RPG and COBOL Tools
  - RPG and COBOL + Modernization Tools, Java Edition
  - RPG and COBOL + Modernization Tools, EGL Edition

- **Rational Developer for AIX and Linux V9.0**
  - C/C++ Edition
  - AIX COBOL Edition

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Packaging: Rational Developer for i V9
RPG & COBOL Tools

▪ **Rational Developer i provides …**

RD i

Edit, Compile, and Debug for
RPG, C/C++, COBOL, CL, DDM, SQL

Eclipse

eclipse

AAS - 5733- RDW feature 0037

Passport D0C5FLL

Packaging: Rational Developer for i V9
RPG & COBOL Tools + Modernization Tools + Java Tools

RD i

Edit, Compile, and Debug for
RPG, C/C++, COBOL, CL, SQL

Eclipse

+

Java tools

JSF, Servlets, web services,
portlets, full J2EE
Development

Eclipse

+

Modernization Tools

Hats Toolkit
Macro Editors, rule editors, …
Web Services Wizards
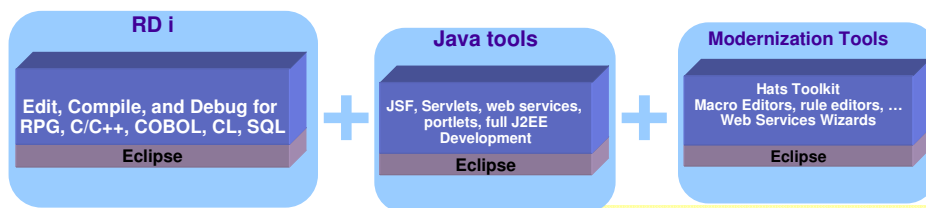
Eclipse

AAS - 5733- RDW feature 0031

Passport D0ZN3LL

▪ **Java Tools adds…**
  – Complete Eclipse-based IDE for Java/JEE, Web/Web 2.0, SOA (Web Services, SCA),
    Portal & Portlet, and more
  – Optimized for WebSphere runtimes

▪ **Modernization Tools adds…**
  ▪ Complete IDE for IBM i languages
  ▸ Web Services Wizards (for RPG/COBOL/HATS) to refactor/wrap IBM i business logic

  ▸ **Also includes HATS Toolkit (but not HATS runtime licenses)**

Packaging: Rational Developer for i V9
RPG & COBOL Tools + Modernization Tools + EGL

RD i

Edit, Compile, and Debug for
RPG, C/C++, COBOL, CL, SQL

Eclipse

+

EGL

EGL, translators, migration
support, limited Java and
Web Development

Eclipse

+

Modernization Tools

Hats Toolkit
Macro Editors, rule editors, …
Web Services Wizards

Eclipse
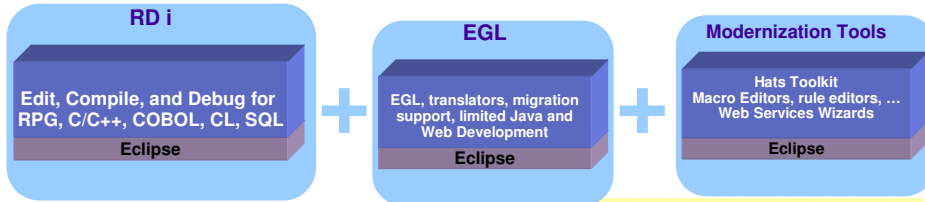
*AAS - 5733- RDW feature 0025
Passport D0ZN5LL*

- **EGL Tools adds…**
  - Complete IDE for EGL development
- **Modernization Tools adds…**
  - Complete IDE for IBM i languages
  - ▸ Web Services Wizards (for RPG/COBOL/HATS) to refactor/wrap IBM i business logic

- ▸ **Also includes HATS Toolkit (but not HATS runtime licenses)**

Rational Developer for i

- *Modern*, Eclipse-based, development tools for IBM i
- Visual editors, outline views, content assist, integrated language help
- *Integrated* file management, search, edit, compile/build, debug capabilities
- Analysis tools (application diagram, call hierarchies, type hierarchies)
- Easily debug batch, interactive, and Web applications with a common visual debugger
- Visual DDS design tools: Screen and Report Designer
- Supports RPG, COBOL, C, C++, SQL, DDM

From this…

Session A - [24 x 80]

Start Source Entry Utility (STRSEU)

Type choices, press Enter.

Source file . . . . SRCFILE   > QRPGLESRC
  Library . . . .   > RDIDEMO
Source member . . . . SRCMBR   > ORDENTR
Source type . . . . TYPE   *SAME
Option . . . . OPTION   *BLANK
Text 'description' . . . . . . TEXT   *BLANK

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this displa
F24=More keys

I902 - Session successfully started

Session A - [24 x 80]

Columns . . . :   6 76   Edit   RDIDEMO/QRPGLESRC
SEU==>   ORDENTR
FMT ** ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+
0025.00 //---------
0026.00 FORDENTD   CF   E   WORKSTN SFILE(ORDSFL:SflRrn)
0027.00 FITEM   IF   E   K DISK
0028.00 FDSTRCT   UF   E   K DISK
0029.00 FCSTMR   UF A E   K DISK   COMMIT(CmtActive)
0030.00 FSTOCK   UF   E   K DISK   COMMIT(CmtActive)
0031.00 FORDERS   O A E   K DISK   COMMIT(CmtActive)
0032.00 FORDLIN   O A E   K DISK   COMMIT(CmtActive)
0033.00 //
0034.00 // Mnemonic values
0035.00 D $DqName   C   CONST('ORDERS   ')
0036.00 D $DqLib   C   CONST('*LIBL   ')
0037.00 D $True   C   CONST('1')
0038.00 D $False   C   CONST('0')
0039.00 D $Warehouse   C   CONST('0001')
0040.00 D $District   C   CONST(1)
0041.00 D $Panel1   C   CONST(1)

F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F10=Cursor   F11=Toggle
F16=Repeat find   F17=Repeat change   F24=More keys

82/089

I902 - Session successfully started

PDM & SEU – the editor…

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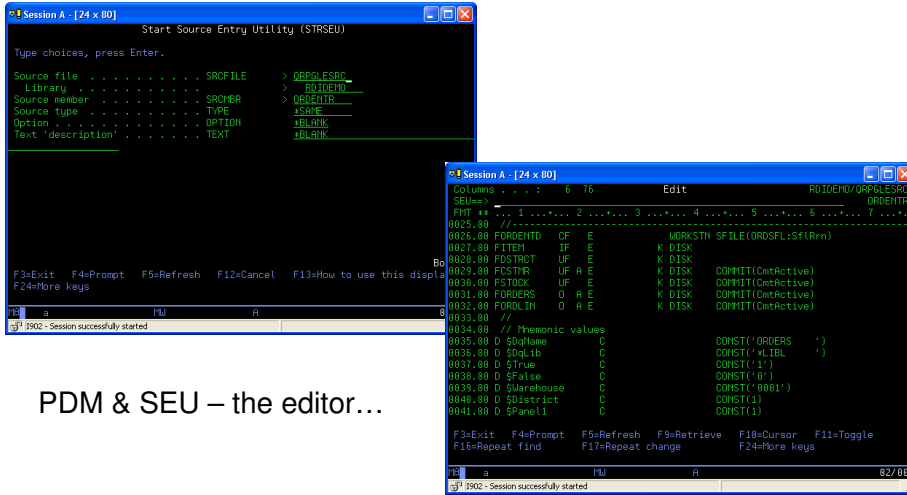
Undo / Redo

* means editor has unsaved changes

Number of changes made since last save.

Remote System Explorer - RemoteSystemsTempFiles/TORJS22A.TOROLAB.IBM.COM/QSYS.LIB/RDIDEMO.LIB/QRPGLESRC.FILE/ORDENTR.RPGLE - IBM

File   Edit   Source   Compile(G)   Navigate   Search   Project   Run   Window   Help

Undo   Ctrl+Z
Redo   Ctrl+Y

Cut   Ctrl+X
Copy   Ctrl+Insert
Paste   Ctrl+V

Delete   Delete
Select All   Ctrl+A

Find/Replace...   Ctrl+F
Find Next   Shift+F4
Find Previous
Find Other
Show All   Ctrl+W

Add Bookmark...

*ORDENTR.RPGLE

Line 678   Column 22   Insert   30 changes
....+....1....+....2....+....3....+....4....+....5....+....6....+....7
065100   CSR   ENDSR
065200   //---------
065300   // SUBROUTINE: WrtDtaQ
065400   //
065500   // Write an entry to the data queue
065600   //
065700   //---------
065800   CSR   WrtDtaQ   BEGSR
065900   //   ---------
066000   //
066100   C   MOVE   CID   CustomerID
066200   C   MOVE $District   DistrictID

- Unlimited undo / redo inside of LPEX editor
  - Undo changes right back to when member was originally opened
  - Even if editor was saved during the editing period
  - Edit > Undo | Redo or use more common keyboard shortcuts Ctrl + Z | Ctrl + Y
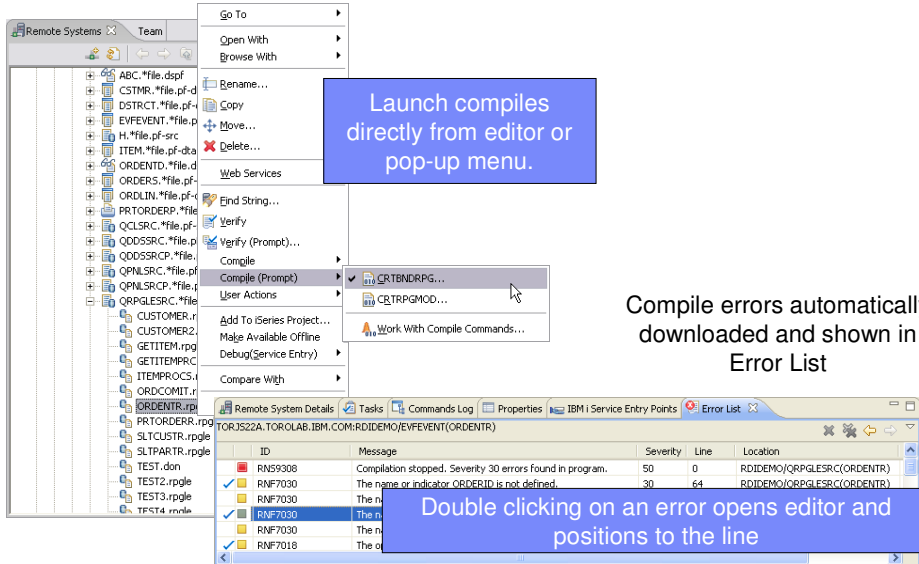
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Copy and Paste

Block copy / paste

Prefix commands for copy / paste

Stream based copy / paste (typical of Workstation software) Uses Windows Clipboard, paste into another editor, email, or document editor.

Outline View and Content Assist

Cross reference information

Content assist helps jog your memory (opcodes, BIFs, fields)

Templates provide a quick way to insert common code patterns (free form and SQL). Predefined or define your own!

New Dynamic refresh!!

From this…

Compile Errors

…To This

Launch compiles directly from editor or pop-up menu.

Compile errors automatically downloaded and shown in Error List

Double clicking on an error opens editor and positions to the line

From this…

Application Diagram ???
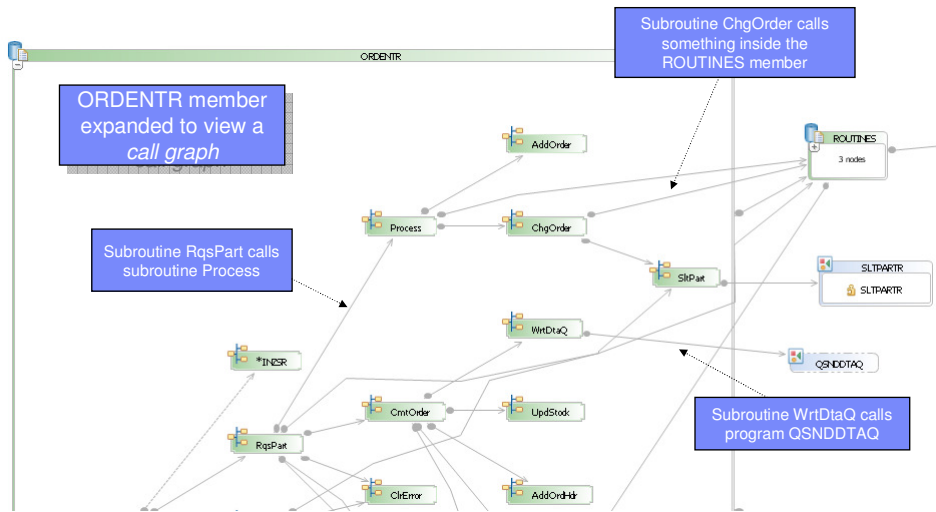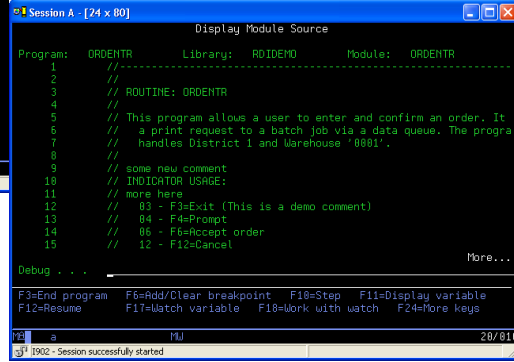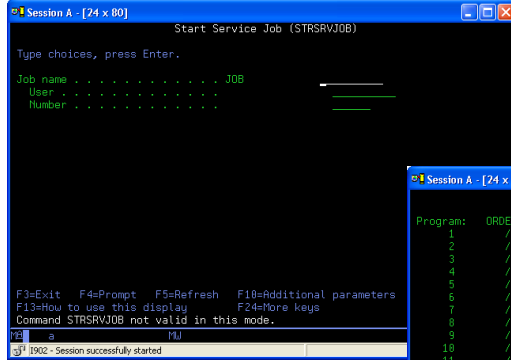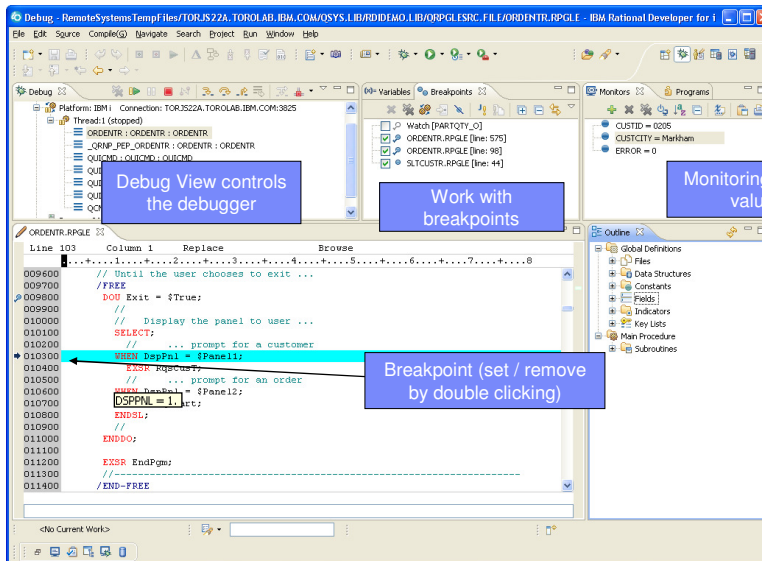
Application Diagram

Subroutine ChgOrder calls something inside the ROUTINES member

ORDENTR member expanded to view a *call graph*

Subroutine RqsPart calls subroutine Process

Subroutine WrtDtaQ calls program QSNDDTAQ

Putting it All Together

Modern Code Editor

Application Diagram

Multiple programs
In a single view

Screen Designer

Rational Developer for i – Free Form Ready

RDi 9.0.1

Calc Specs get out of jail

```
C                dou      wasFound
C* Look up the custId in the file
C     'custKey'  LOOKUP   custArray                        01
C                EVAL     custAddress = %SUBST(fullAddress :1 :50);
C     custAddress  MOVEA              fullAddress
C     custId     CHAIN    custFile
C                ENDDO
```

- Bracketed by /free and /end-free directives
- Calcs begin with opcode and end with semicolon

  - In 9.0.1 we no longer need /free directives
  - The styling of the text is now token-based rather than operand-based.
  - Highlighting of literals, BIFs, control op-codes

```
/free
   dou wasFound;
         //Look up the custId in the file
         custName = %LOOKUP('custKey' : custArray: 1% %SIZE(custArray));
         custAddress = %SUBST(fullAddress :1 :50);
   /end-free
C     custAddress  MOVEA              fullAddress
   /free
         CHAIN custKey  custFile;
   ENDDO;
/end-free
```

```
         dou wasFound;
         //Look up the custId in the file
         custName = %LOOKUP('custKey' : custArray
                                    : 1
                                    : %SIZE(custArray));
         custAddress = %SUBST(fullAddress :1 :50);
C     custAddress  MOVEA              fullAddress
         CHAIN custId  custFile;
      enddo;
```

Today H, F, D and P specs are free too!

Compiler Options

```
.....HKeywords+++++++++++++++++++++++++++++++++++++++++.
     HOPTION(*SRCSTMT :*NODEBUGIO) ALWNULL(*USRCTL)
```

```
ctl-opt option(*SRCSTMT: *NODEBUGIO)
        alwnull(*USRCTL);
```

File Definitions

```
.....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywords+++
000101     Fkeyfilea  IF   E        DISK
```

```
dcl-f keyfilea;
```

Data Definitions

```
DMAX_ELEMS         C              1000
DfullName          S         50A   VARYING
D                               INZ('Unknown name')
Dds1               DS            QUALIFIED
D num                   10I 0
D name                  100C
DQp01RenamUnlink   PR        10I 0
D oldName               *    VALUE OPTIONS(*STRING)
D newName               *    VALUE OPTIONS(*STRING)
```

```
Dcl-C MAX_ELEMS 1000;
Dcl-S fullName VARCHAR(50) INZ('Unknown name');
Dcl-DS ds1 QUALIFIED;
  num INT(10);
  name UCS2(100);
End-DS;
Dcl-PR Qp01RenamUnlink INT(10);
   oldName POINTER VALUE OPTIONS(*STRING);
   newName POINTER VALUE OPTIONS(*STRING);
End-PR;
```

Procedure Definitions

```
PgetCurrentUserName...
P               B                    EXPORT
D               PI         10A
P getCurrentUserName...
P               E
```

```
Dcl-Proc getCurrentUserName EXPORT;
   Dcl-Pi *N CHAR(10) End-Pi;
End-Proc;
```

This is NOT a Good Modernization Solution…..

The Newest Mobility Solutions from Sampling of Vendors

- Lansa
- looksoftware
- Profound Logic
- Rocket Software
- Zend Server for i
- Many Others

Why Consider one of these Products ?

- - Use existing RPG/COBOL and DDS skills
- - Intuitive development environment
- - Leverage your existing IBM i applications
- - Transform in days not years
- - No need to learn new languages
- - Incorporate features of the mobile device into your backend app
        - Camera, GPS location, Maps, etc
- - Write once, deploy to many devices
     - Put the need to chase the moving devices on someone else
- - Cost effective
     - Compare cost of re-writing vs transforming

How these Solutions Work

New Graphical Interface

Rich GUI Development Environment

IBM i Main Menu
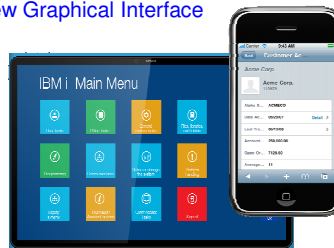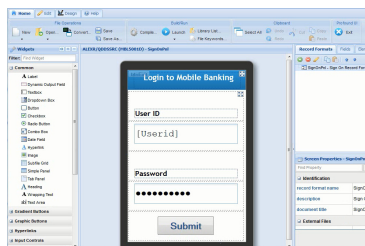
Run Time Engine
Interfaces between
Mobile / Web Interfaces

Backend RPG / COBOL

Mostly unchanged

Other Technologies of Interest

- Integrated Web Services - http://www-03.ibm.com/systems/i/software/iws/

- Integrated Application Server - http://www-03.ibm.com/systems/i/software/ias/

- Rational Open Access: RPG Edition - http://www-01.ibm.com/software/rational/products/openaccess/

- PHP – Zend Server for IBM i - http://www-03.ibm.com/systems/power/software/i/php/index.html

- Ruby – Ruby on Rails for IBM i http://powerruby.com

- Data connectivity – XML Service http://www.youngiprofessionals.com/wiki/XMLSERVICE

- Data connectivity – Java Toolbox http://www-03.ibm.com/systems/power/software/i/toolbox/index.html

- Database Modernization - http://www-03.ibm.com/systems/power/software/i/support/workshops/index.html

- Access Client Solutions - http://www-03.ibm.com/systems/power/software/i/access/solutions.html

- Application Runtime Expert - http://www-03.ibm.com/systems/power/software/i/are/index.html
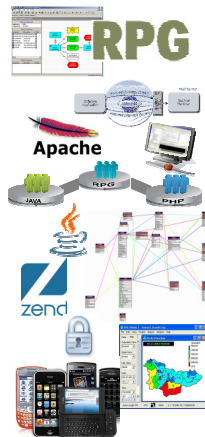

The Application Modernization Redbook

An innovative approach, combining general best practices of modernization along with the solutions, tools, and ISVs that can help make it happen

Redbook Content

17 Chapters describing all aspects of Application Modernization

- Database
- Modern RPG
- Web Services
- Communication between applications
- Graphical User Interfaces
- Development tools
- Development best practices
- Flexible applications
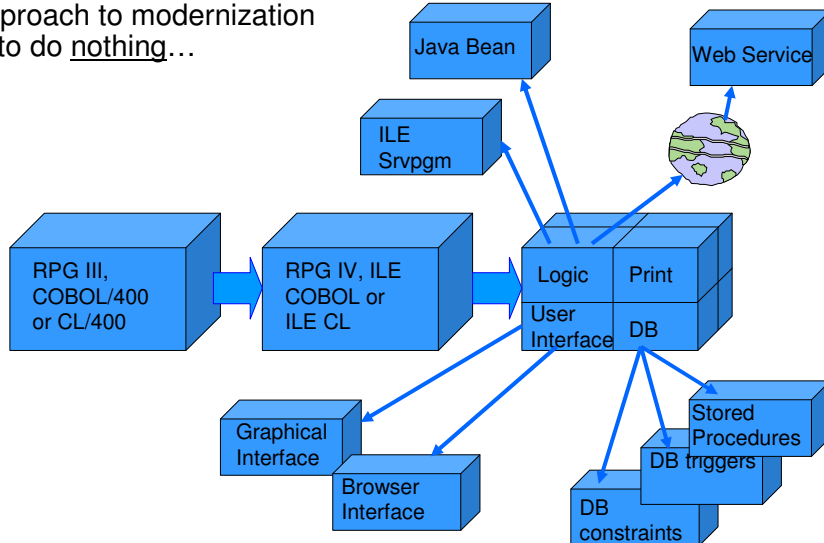- Business case for modernization
- Many other possible topics

Solution Guides

Many ISV, Partners, and Solution providers have written a technical solution guide describing how they can help accomplish application modernization

Publish Early 2014

Summary – The only <u>bad</u> approach to modernization is to do <u>nothing</u>…

IBM i 7.1 – Where to Find More Details

- DeveloperWorks
  - Main page: http://www.ibm.com/developerworks/ibmi
  - Landing page for Refresh Updates: http://www.ibm.com/developerworks/ibmi/techupdates
- Blogs
  - Steve Will: http://ibmsystemsmag.blogs.com/you_and_i/
  - Dawn May: http://ibmsystemsmag.blogs.com/i_can/
  - Mike Cain: http://db2fori.blogspot.ca/
  - Tim Rowe: http://www.iprodeveloper.com/blog/modern-i-zation-25/ibm-I
  - Alison Butterill: http://ibmsystemsmag.blogs.com/isight/

http://www.ibm.com/developerworks/ibmi/

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Revised September 26, 2006

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