# Introduction to CODE

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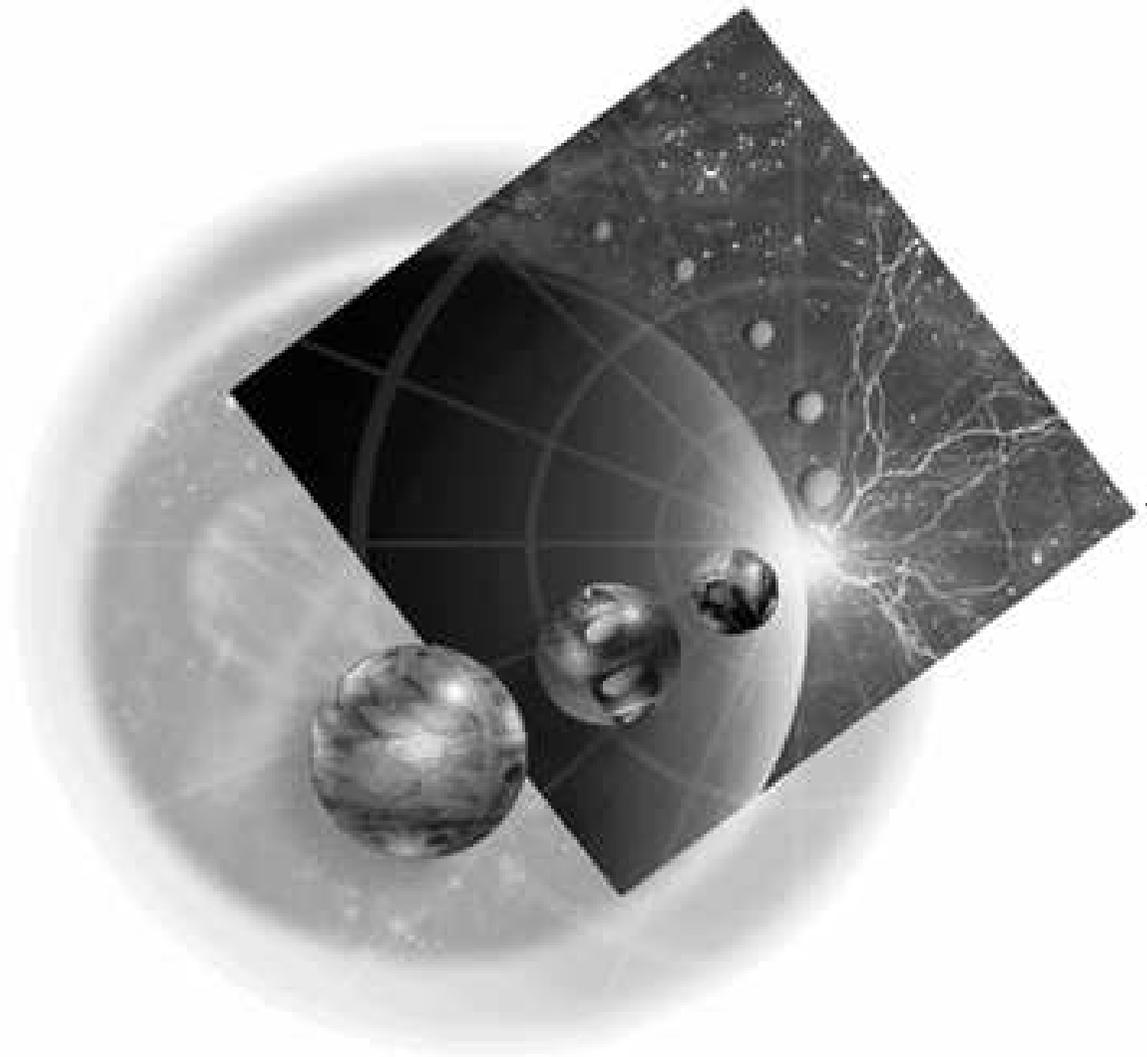
Acknowledgement and Disclaimer

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John Steinbacher, IBM Canada, Ltd

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CODE

Not your father's SEU!

CODE - E:\ADTSWIN\LOCAL\samplev2.rpg *

File Edit View Actions Options Windows Help

E:\ADTSWIN\LOCAL\samplev2.rpg   *

Row 74   Column 33   Replace 1 chang

```
......CL0N01N02N03Factor1+++Opcde act
000710   C                        EXCPTADDN
000720   C* Re-access record to bring in
000730   C          ACCT          CHAINMLGM
000740   C    20                  DO
000750   C                        MOVE 'REA
```

RPG/400 Help - CHAIN (Random Retrieval from a File) - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

CHAIN (Random Retrieval from a File)

```
*----------*-----------------*-----------------*-----------------
+   CODE   +     FACTOR 1     +     FACTOR 2     +      RESULT
+          +                  +                  +      FIELD
*----------*-----------------*-----------------*-----------------
+ CHAIN    + Search           + File name        + Data
  (N)      + argument         +                  + structure
```

Navigator

File Services View Options

MAIN → SUBPGM
MAIN → VALIDT
VALIDT → COD1SR
VALIDT → COD2SR
VALIDT → COD3SR
VALIDT → COD4SR
COD2SR → RTVMSG
COD2SR → DSPMSG
COD4SR → SNDADR
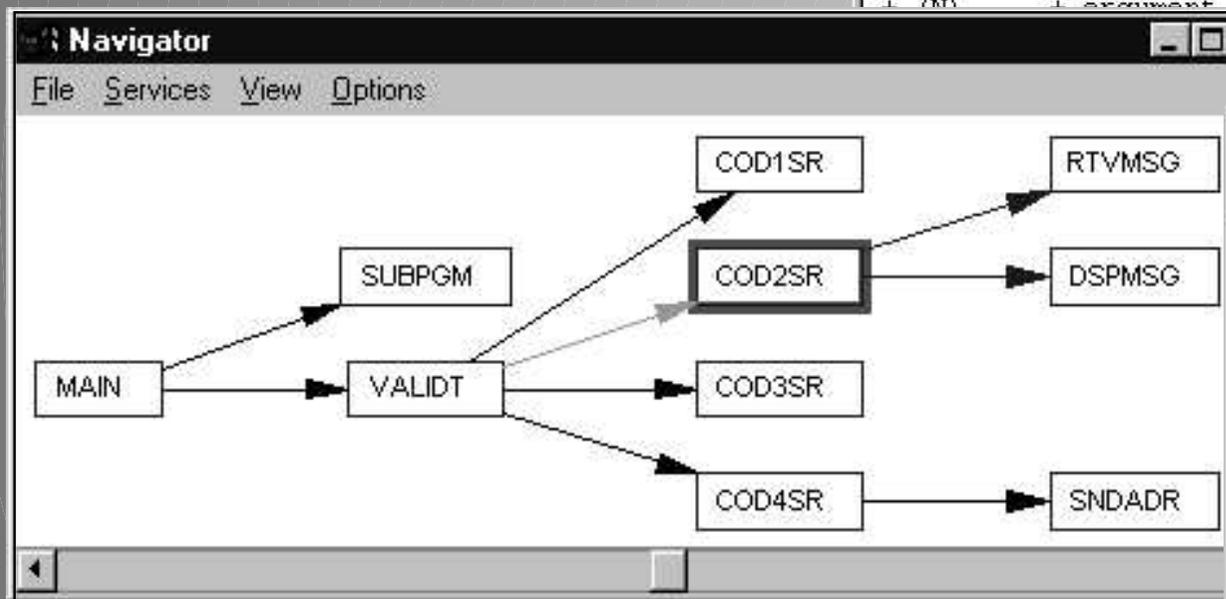
D:\ADTSW
- File Key
- MENU
- ENTRY
- INFO
- SF
- SFCTL
- SFBOT
- SCREEN1

Details | SCREEN1 | Sourc

MENU

Ignore all indicators

```
1. Work with cu
2. Work with in
3. Work with pa
4. Work with ac
5. Work with on
6. Work with pe

90. Sign off
```

The Agenda

- **What is CODE?**

- **The CODE Tools:**
  - Editor
  - Designer
  - Distributed Debugger
  - Project Organizer

- **Summary**

- **CODE demo**

WebSphere Development Studio for iSeries

CODE

Web | Java | 3GL

✓ For RPG, COBOL, CL, C, C++, DDS

VisualAge RPG

✓ For RPG GUI

VisualAge for Java for iSeries

✓ For Java

✓ Pro plus Enterprise Toolkit for iSeries

WebSphere Studio For iSeries

✓ For Web sites and Web pages

✓ Standard plus Affinity Toolkit for iSeries

WebFacing

✓ Build a Web interface to existing 5250 applications
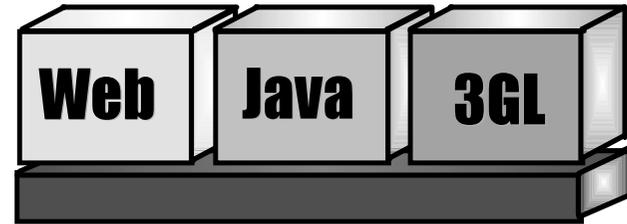
What is CODE ?

- **Application development environment for iSeries host applications**
- **Replacement for PDM, SEU and SDA**
- **Runs on Windows PC**
- **Significant productivity enhancements for:**
  - ► Edit / compile cycle
  - ► DDS Designing
  - ► Debugging
  - ► Work at home scenario
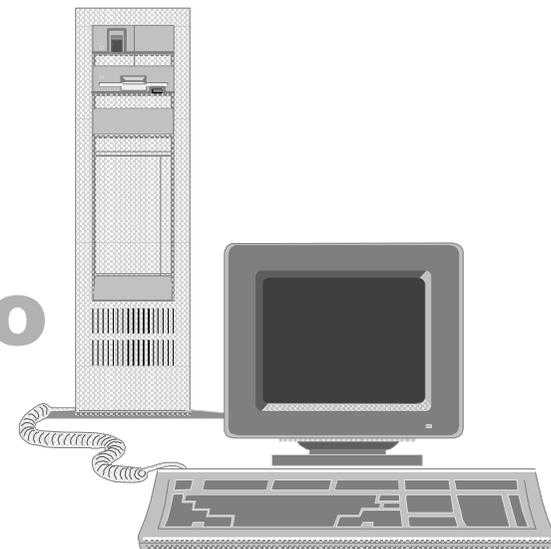
CODE Includes...
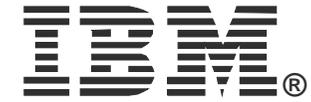
- **Editor**
  - ‣ A powerful PC editor for iSeries and PC source with integrated local and remote compilation.
- **Designer**
  - ‣ A rich graphical interface for designing DDS display, printer and physical files.
- **Debugger**
  - ‣ Debug host applications from your workstation.
- **CODE Project Organizer**
  - ‣ PDM for your PC - it integrates and organizes your programming projects.

CODE Value Proposition
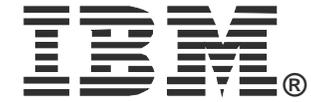
CODE delivers...

- ✓ **Significant productivity gains**
  - ‣ New functions and GUI
  - ‣ Shortens edit/compile/debug cycle
- ✓ **Off-loads host cycles**
  - ‣ Use PC for editing, designing and verifying
  - ‣ Work at home! In 'disconnected' mode
- ✓ **Investment protection**
  - ‣ Makes use of existing developer skills
- ✓ **Migration path**
  - ‣ From host applications today to Web applications tomorrow.
- ✓ **Fun**

Working the legacy way
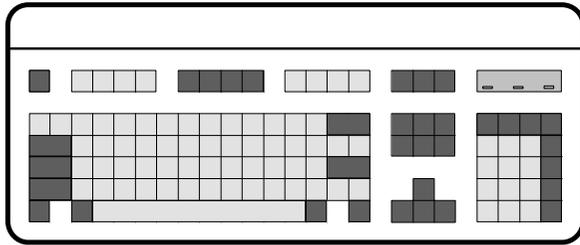
- **1- Open source**
- **2- Make changes**
- **3- Save source**
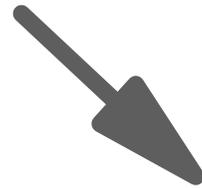
- **4- Submit compile**
- **5- Batch job ends**
- **6- Completion message**
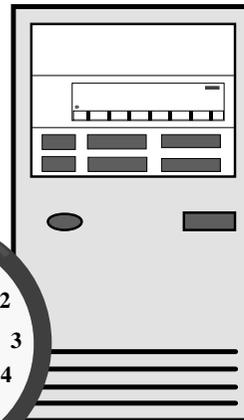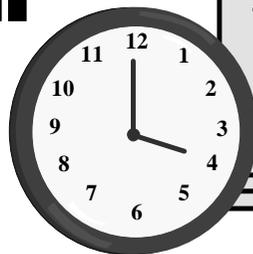
- **7- Look for listing**
- **8- Look for errors**
- **9- Find fix in source**
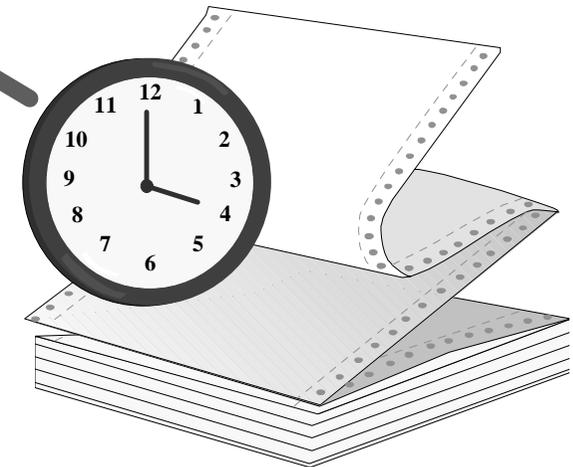
Working With CODE
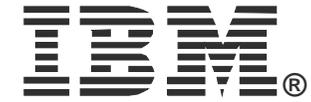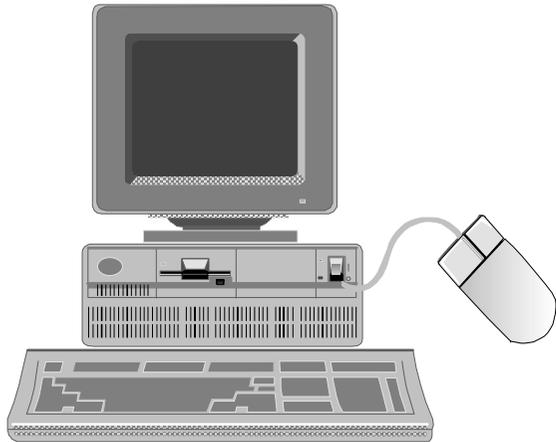
- **1- Open Source**
- **2- Make changes**
- **3- Verify**
  - **- Error feedback**
- **Event files**

- **4- Submit compile**
  - **- Auto save to host**
  - **- Error feedback**
  when compile ends

CODE - An Integrated Environment

Project Organizer

Editor

Program Verifier

Designer

Error List

Debugger

Program Generator
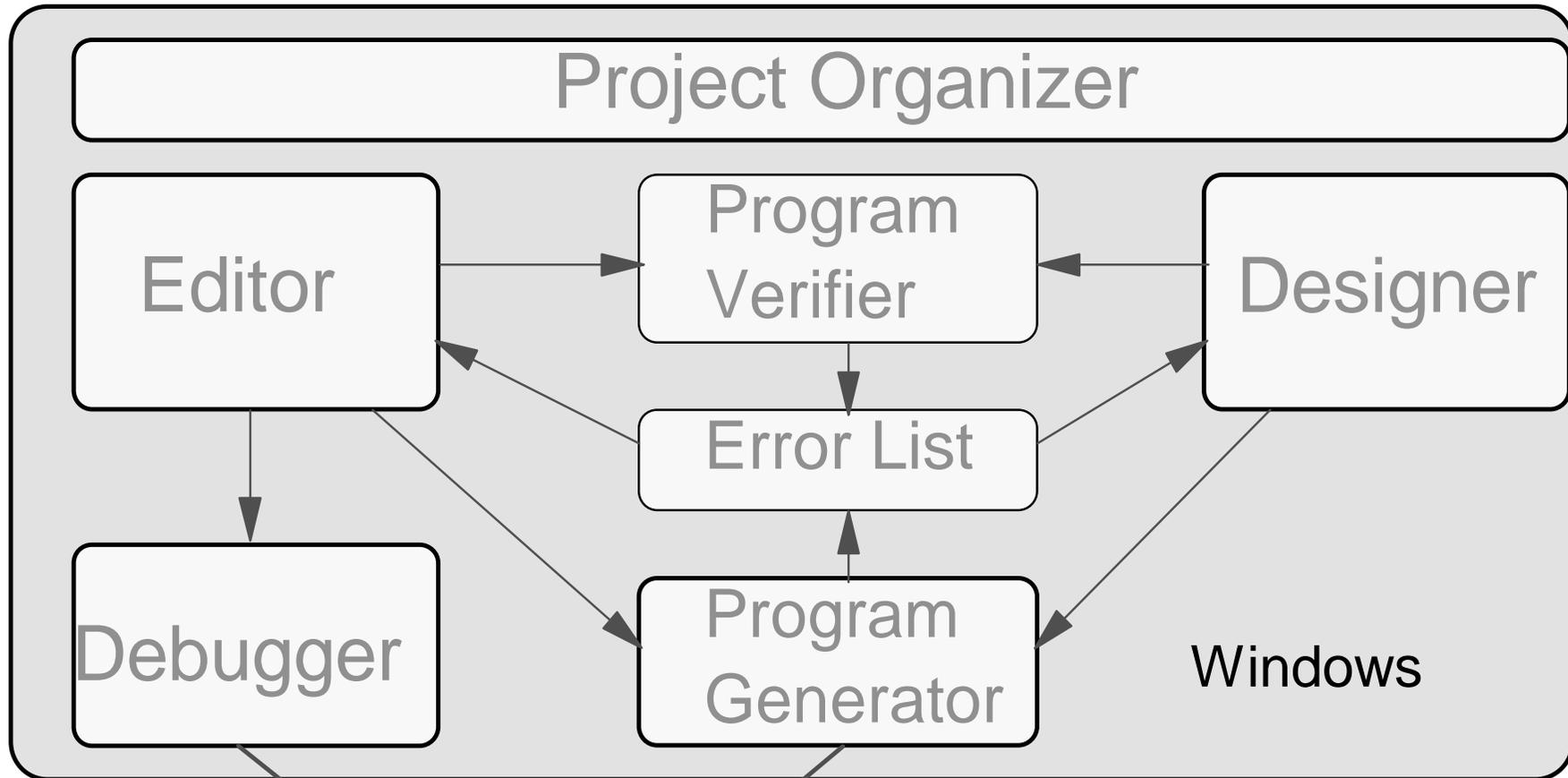
Windows

Host execution

The CODE Editor

► Seamless access to local and host source, ADM parts

► Language-sensitive editing

► Windows GUI, clipboard, unlimited undo, multiple files

► Command shell

► Programmable and customizable

► Plus lots more...
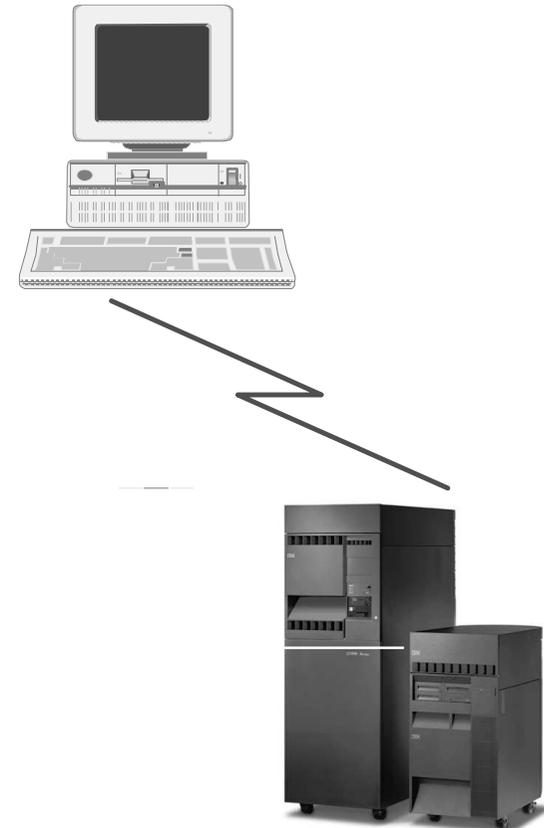
The CODE Editor
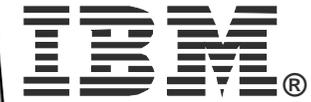
► **Language-support**

- Token highlighting
- Built-in syntax checking
- Program verification
- SEU-commands, format rulers and prompting
- Lots of on-line help
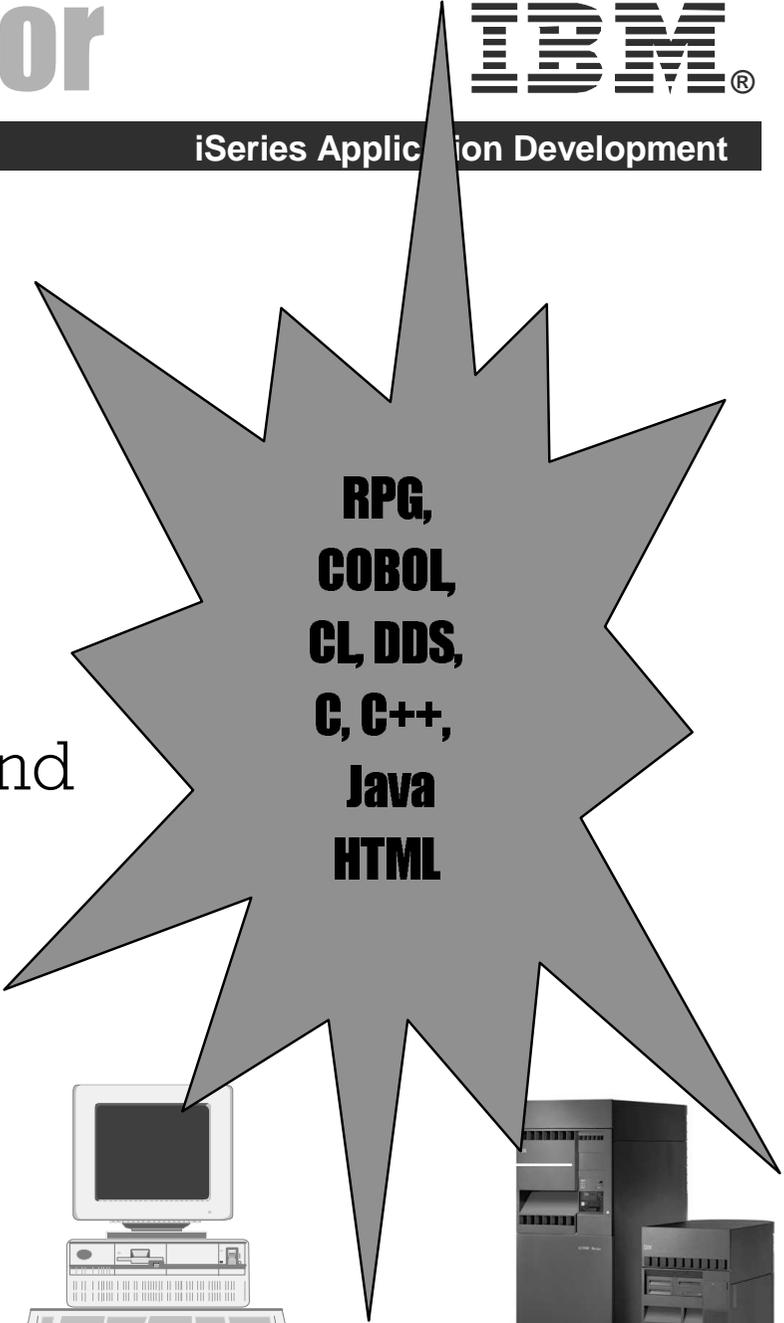
RPG, COBOL, CL, DDS, C, C++, Java HTML

The CODE Editor Window

```
CODE - c:\temp\payroll.dsp
File  Edit  View  Actions  Options  Windows  Help

c:\temp\payroll.dsp

Row 48        Column 21      Insert
.....AAN01N02N03........................Functions++++++++++++++++++
000390    A                                23  7'F3-End of Job'
000400    A*%%GP MAIN_MENU   01
000410    A*  89/04/10  16:28:41    SING       REL-R01M02  5728-PW1
000420    A*  THE EMPSEL FORMAT ALLOWS SELECTION OF THE EMPLOYEE TO BE
000430    A*  MAINTAINED AND THE TYPE OF MAINTENANCE TO BE PERFORMED
000440    A            EMPSEL
000440DDS7410S Characters in indicated field not allowed.
000450    A*%%TS  SD  19920629  165055  SMYTH       REL-V2R2M0  5738-PW1
000460    A                                BLINK
000470    A   60                           ALARM
000480    A                                CA11(11 'Use subfile')
000490    A                             2  5'PRG01'
000500    A                             2 30'Time Reporting System'

c:\temp\payroll.dsp saved
```

Status area

Command line

Format line

Sequence numbers

Syntax checking

Quick file access
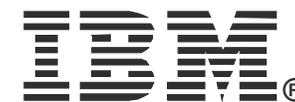
IBM Software

SEU - Like Features

Format line

SEU commands

F-spec prompt

```
CODE - <OS400>CODELAB/QRPGLESRC(PAYROLL)                      _ □ ×

File  Edit  View  Actions  Options  Windows  Help

<OS400>CODELAB/QRPGLESRC(PAYROLL)

Row 30        Column 10       Replace
       .....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywords++++++++++++++++
000280     FEMPMST      UF A E           K DISK
   i5      FPRJMST      UF A E           K DISK
000300     FRSNMST      UF A E           K DISK
000310     D*
```

RPG IV - F - File Description   ×

File Name	File Type	File Designation	End of File	File Addition	Sequence
RSNMST	U	F		A	

File Format	Record Length	Limits Processing	Length of Key Field	Record Address Type	File Organization
E				K	

Device: DISK   Keywords: Comments:

```
.....FFilename++IPEASFRlen+LKlen+AIDevice+.Keywords++++++++++++++++++++++++Comments++++++
      FRSNMST    UF A E         K DISK
```

Buttons: OK | Continue | Select... | Cancel | Help

Finding Your Way

CODE - <OS400>CODELAB/QRPGLESRC(PAYROLL)

File Edit View Actions Options Windows Help

<OS400>CODELAB/QRPGLESRC(PAYROLL)

Row 339   Column 31   Replace
.....CL 0N01Factor1+++++++Opcode(E)   ++D

000500	C	MAIN	BEGSR
003390	C	EDITSL	BEGSR
003960	C	ACDESR	BEGSR
004180	C	ADDCDE	BEGSR
004330	C	CHGCDE	BEGSR
004500	C	DELCDE	BEGSR
004660	C	INUCDE	BEGSR

Filter

Include all lines with this string

BEGSR

☐ Case sensitive

☐ Pattern match

Filter   Cancel   Help

/BEGSR

Filtering

CODE - Find and Replace

Find   BEGSR

Replace with

◉ Replace this occurrence   ☐ Case sensitive

○ Replace, then find next   ☑ Pattern match

○ Replace all occurrences   ☑ Wrap

Find   Replace   Options...   Cancel   Help

Command line

Find and Replace

ation Development

IBM ®

IBM Software

Integrated Error Feedback **IBM** ®

Local processing saves cycles on your iSeries

Editor → Program Verifier

Editor → Error List

Error List

Program Generator
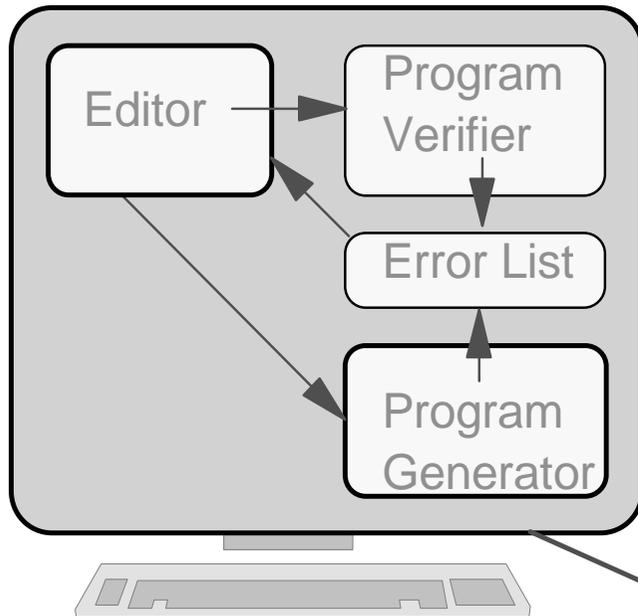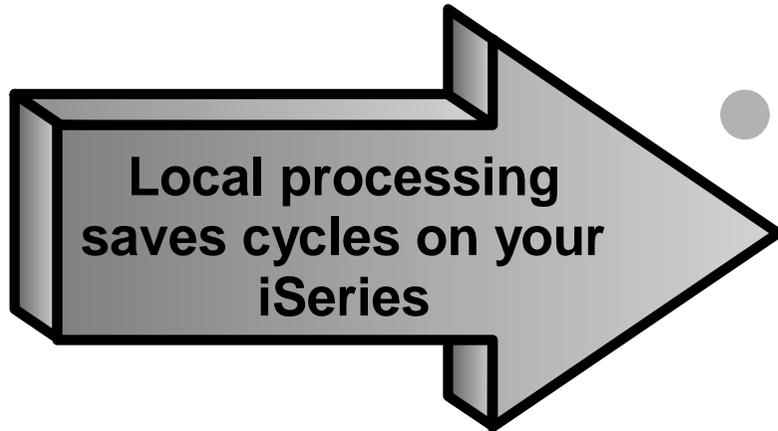
● New edit-compile paradigm

- Local syntax check
- Local program verify
- Caching: /COPY, DB refs
- Invoke host compiler

● From the edit window you can:

- Work with syntax checker, verifier, and compiler errors
- Search language reference manuals
- Start debug session

The Program Verifier

CODE - <OS400>CODELAB/QRPGLESRC(PAYROLL)

File Edit View **Actions** Options Windows Help

<OS400>CODE

Row 338

Actions menu	
Issue edit command... Esc	
Compare...	
Keystroke recorder	▶
Syntax check selection	
Syntax check file	
Verify program	▶
Compile	▶
Create program... Ctrl+Shift+P	
Update program	▶
Debug	▶

Prompt...
No prompt

```
003360    C
003370    C
003380    C
003390    C
003400    C
003410    C
003420    C
003430    C
003440    C          MOVE      '0'
003450    C*
```

es the ti

lay field

*BLANKS

ILE RPG - Program Verifier

Listing | Compile | Data | Settings

Source Output
☑ Output listing

Listing Options
☐ Cross-reference listing
☑ Show COPY statements
☐ Expand DDS statements
☐ External procedures and fields
Lines per page   60
Path   H:\Program Files\IBM\WDT400\Tmp
File name   VERIFY.LST
Source listing indentation   *NONE ▼

☐ Edit listing file

Submit   Cancel   Default   Help

The Error-List Window

Help - at your fingertips

- **Context-sensitive**
- **Message help**
- **RPG, COBOL, DDS online references**
- **Lots of online documentation**

RPG/400 Help - CHAIN (Random Retrieval from a File) - Netscape

File Edit View Go Communicator Help

Back   Forward   Reload   Home   Search   Guide   Print   Security   St

CHAIN (Random Retrieval from a File)

```
*---------*----------------*----------------*----------------*
+    CODE   +      FACTOR 1    +     FACTOR 2    +       RESUL
+          +                 +                +            FIEL
*---------*----------------*----------------*----------------*
+ CHAIN   + Search          + File name      + Data
+ (N)     + argument        +                + structure
*---------*----------------*----------------*----------------*
```

The CHAIN operation retrieves a record from a full procedural file (F in position 16 of the file description specifications), sets a record identifying indicator on (if specified on the input specifications), and places the data from the record into the input fields.

CODE - <OS400>CODELAB01/QRPGLESRC(PAYROLL)

File Edit View Actions Options Windows Help Extras

`<OS400>CODELAB01/QRPGLESRC(PAYROLL)`

Row 117   Column 26   Replace

```
.....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result++++++++Len++D+HiLo
000116   C*
000117   C      *INKC       IFEQ      '0'
000118   C      RSCDE       CHAIN     RSNMST                          5
000119   C                  EXSR      ACDESR
000120   C                  ELSE
```

he key or relative record
is by key, factor 1 can be
nstant, or a literal. In
) name can be specified in
ess is by relative record
l or a numeric field with

me that is to be read. A

Multi-File Search

CODE - <OS400A>CODELAB/QRPGLESRC(PAYROLLG)

File Edit View Actions Options Windows Help

<OS400A>CODELAB/QRPGLESRC(PAYROLLG)

Row 352   Column 12   Replace

.....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result+++++++Len++D+HiLo|

```
000348        C*   selected.
000349        C*
000350        C       EMPAPL          IFEQ      'X'
000351        C       PRJAPL          ANDEQ     'X'
000352        C       EMPAPL          OREQ      'X'
000353        C       RSNAPL          ANDEQ     'X'
000354        C*   THE BUG IS HERE
000355        C*   ***************
000356        C                       MOVE      '1'            *IN60
```

empapl - Multi-File Search

File Edit View Options Tools H

```
—  C          MOVE    *BL
—  C* IF EMPAPL (EMPLOYEE
—  C    EMPAPL    IFEQ    ')
—  C    EMPAPL    IFEQ    ')
—  C    EMPAPL    OREQ
—  C    EMPAPL    IFEQ    '
—  C    EMPAPL    IFNE    '
—  C    EMPAPL    ANDNE
```

<OS400A>CODELAB/QRPGLE:

```
—  C          MOVE    *BLANKS    EMPAPL
—  C* IF EMPAPL (EMPLOYEE MAINTENANCE) EQUALS X, THE PROGRAM
—  C    EMPAPL    IFEQ    'X'
—  C    EMPAPL    IFEQ    'X'
—  C    EMPAPL    OREQ    'X'
—  C    EMPAPL    IFEQ    ''
—  C    EMPAPL    IFNE    ''
—  C    EMPAPL    ANDNE   'X'
```

Found 16 occurrences of 'empapl'.

Click to open file

Search host libraries, directories, ADM parts

The Indent Function

```
CODE - <OS400>CODELAB/QRPGLESRC(PAYROLL) : INDENTED        _ □ ×

File  Edit  View  Actions  Options  Windows  Help

<OS400>CODELAB/QRPGLESRC(PAYROLL) : INDENTED                    ▼

Row 139      Column 1      Replace                 Browse
     ....CL0N01Factor1+++++++Opcode(E)+Factor2+++++++Result+++++++Len++D+Hi

001370   C*
001380   C    *INKC       IFEQ       '0'
001390   C    ACODE       |  IFEQ        'A'
001400   C    *IN50       |  |  ANDEQ       '1'
001410   C                |  |  MOVE        'A'            ACREC
001420   C                |  |  WRITE     RCRSN
001430   C                |  |  ELSE
001440   C    ACODE       |  |  IFEQ        'A'
001450   C    *IN50       |  |  |  ANDEQ        '0'
001460   C    ACREC       |  |  |  ANDEQ        'D'
001470   C                |  |  |  MOVE        'A'            ACREC
001480   C                |  |  |  UPDATE     RCRSN
001490   C                |  |  |  ELSE
001500   C    ACODE       |  |  |  IFEQ        'D'
001510   C                |  |  |  |  MOVE        'D'            ACREC
001520   C                |  |  |  |  UPDATE     RCRSN
001530   C                |  |  |  |  ELSE
001540   C    ACODE       |  |  |  |  IFEQ        'C'
001550   C                |  |  |  |  |  UPDATE     RCRSN
001560   C                |  |  |  |  END
001570   C                |  |  |  END
001580   C                |  |  END
001590   C                |  END
001600   C                |  ELSE
001610   C                |  GOTO       END
001620   C                END
```

The Navigator

CODE - E:\adtswin\system\NAVIG.OUT

File Edit View Actions Options Windows Help

E:\adtswin\system\NAVIG.OUT

Navigator statistics – E:\ADTSWIN\LOCAL\samplev2.rpg

Total functions: 10

Called functions
    MAIN
            SUBPGM
            VALIDT
            VALIDT
            SUBPGM
    VALIDT
            COD1SR
            COD2SR
            COD3SR
            COD4SR
    COD1SR
    COD2SR
            RTVMSG
            DSPMSG

Navigator

File Services View Options
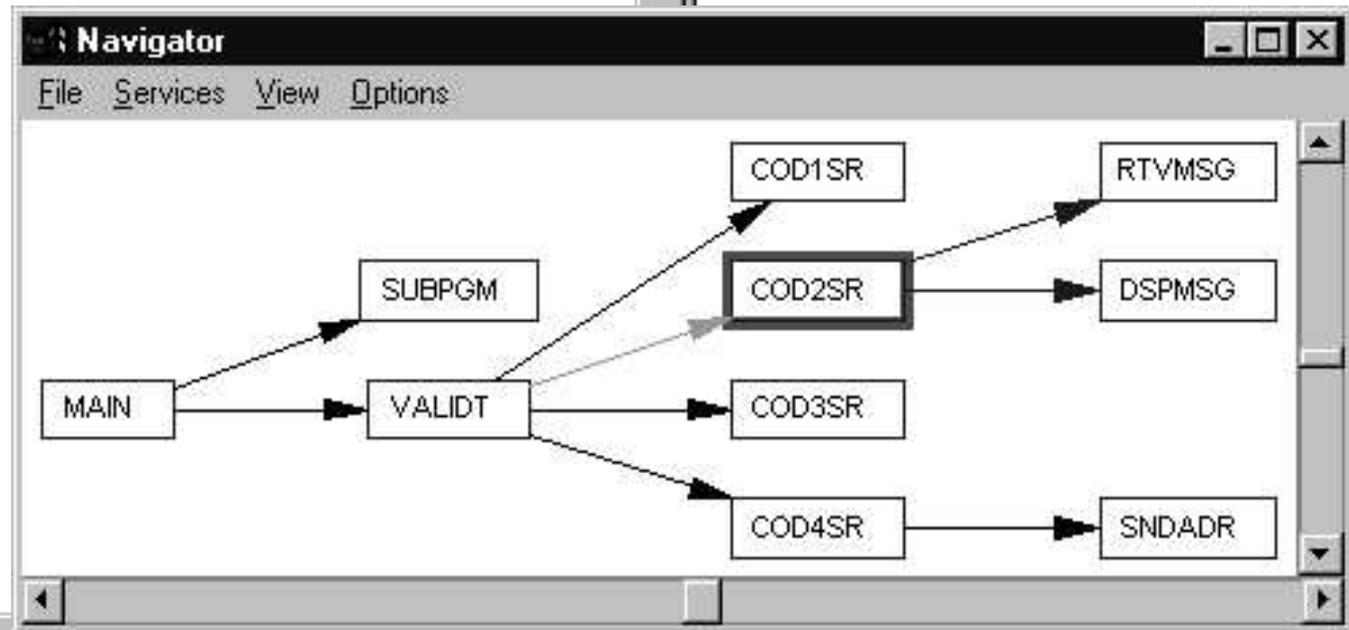
Graphical Compare

CODE - E:\ADTSWIN\LOCAL\samplev1.rpg: 2

File   Edit   View   Actions   Compare   Options   Windows   Help

E:\ADTSWIN\LOCAL\samplev2.rpg: 2

| Row 163 | Column 1 | Replace |

```
.....C 0N01N02N03Factor1+++OpcdeFacto
     C*     Validate routine goes to
     C                        EXSR VAL
     C          MLACCT        CABEQ*ZE
     C          MLSRCH        CABEQ*BL
     C          MLCITY        CABEQ*BL
     C          MLSTAT        CABEQ*BL
     C          MLZIP         CABEQ*ZE
     C* Record is already added, pe
     C                        UPDATMLG
     C*     Check error routine will
     C          *IN20         IFEQ '1'
     C* Status 01021 is a duplicate
     C          STS           CABEQ010
     C                        MOVE 'DS
     C                        GOTO BAD
     C                        ENDIF
     C                        GOTO PRO
```

E:\ADTSWIN\LOCAL\samplev1.rpg: 2

| Row 159 | Column 1 | Replace |

```
.....C 0N01N02N03Factor1+++OpcdeFacto
     C*     Validate routine goes to
     C                        EXSR VAL
     C* Record is already added, pe
     C                        UPDATMLG
     C*     Check error routine will
     C     20                 EXSR CHK
     C                        GOTO PRO
     C                        END
     C* If Chg type, validate field
     C          '2'           IFEQ ACT
     C*     Validate routine goes to
     C                        EXSR VAL
     C                        UPDATMLG
     C*     Check error routine will
     C     20                 EXSR CHK
     C                        GOTO PRO
     C                        END
```

Inserted lines

Deleted lines

Editor Programming

● **Why program it?**

- Need for a new editor function
- Repetitive task, fastpath key for heavily used function
- Tailor the editing environment for your shop

● **What can you do?**

- Specify editor default settings
- Add editor functions and your own macros to the menus and toolbar
- Assign/re-assign keys and/or line commands to editor functions and your own macros
- Interact with the host via the CODESRV command

● **How do you do it?**

- Write macros in REXX or Java + editor commands
- Use the 'profiles' to load in the macros.

Sample Editor Extensions

- **Many sample editor macros shipped with product**
- **Since V3R2M2: Java examples**
  - RPG IV Procedure SmartGuide
  - RPG IV D-Spec SmartGuide
  - RPG and Cobol Cross Reference Window
  - numerous more
- **Source included too**

  ► **See how its done, write your own!**

Procedure SmartGuide

IBM®

Actions | Options | Windows | Help

Issue edit command...   Esc

Compare...

Keystroke recorder

SmartGuides   Create procedure...

Create D-specification...

Syntax check
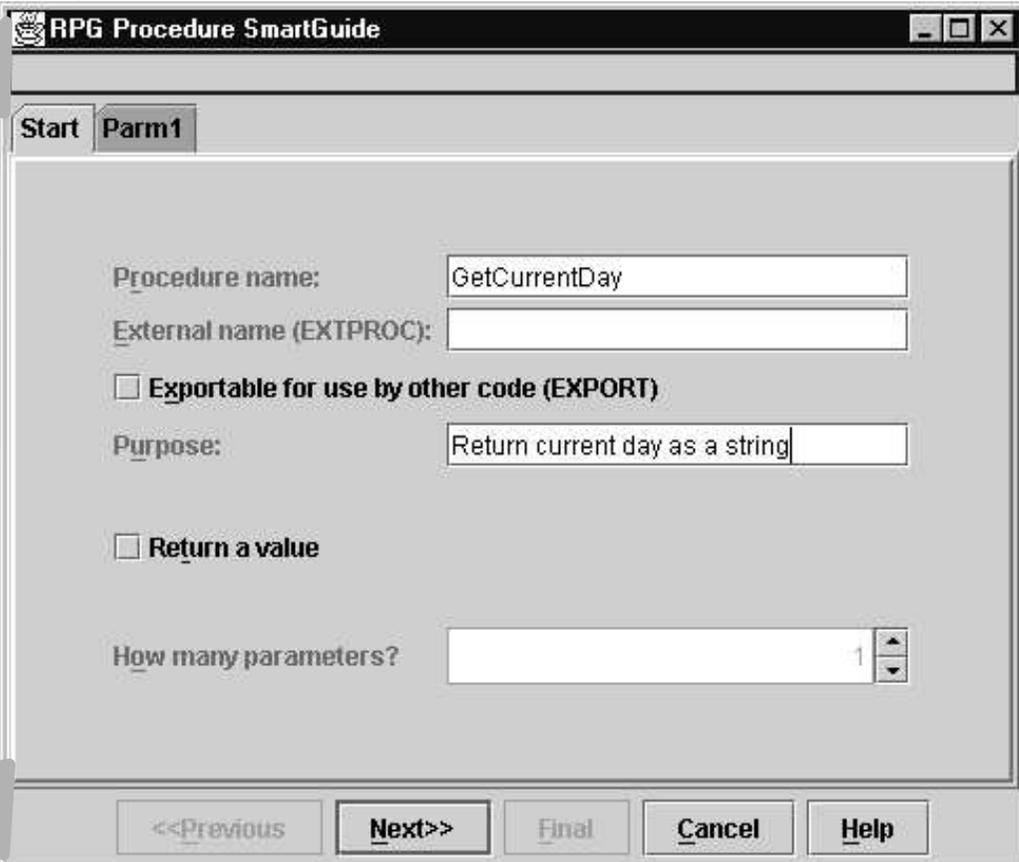
RPG Procedure SmartGuide

Start | **Parm1**

Procedure name: GetCurrentDay

External name (EXTPROC):

☐ **Exportable for use by other code (EXPORT)**

Purpose: Return current day as a string

☐ **Return a value**

How many parameters?   1

<<Previous | Next>> | Final | Cancel | Help

Procedure SmartGuide

Procedure prototype

Procedure template

```
CODE - Untitled Document 6  *                                    _ □ ×
File  Edit  View  Actions  Options  Windows  Help  Extras

Untitled Document 6    *

Row 20        Column 60      Replace   1 change.
.....PName+++++++++..B..................Keywords++++++++█++++++++++++++++++Co
00001
00002       D*-------------------------------------------
00003       D* Prototype for procedure: GetCurrentDay
00004       D*-------------------------------------------
00005       D GETCURRENTDAY    PR
00006       D DAY                                  D    DATFMT:(*YMD.)
00007
00008       P*-------------------------------------------
00009       P* Procedure name: GetCurrentDay
00010       P* Purpose:        Return current day as a string
00011       P* Parameter:      day =>
00012       P*-------------------------------------------
00013       P GETCURRENTDAY    B
00014       D GETCURRENTDAY    PI
00015       D DAY                                  D    DATFMT:(*YMD.)
00016
00017       C* Your calculation code goes here
00018
00019       C                  RETURN
00020       P GETCURRENTDAY    E
```

D-Spec SmartGuide

Actions **Options** **Windows** **Help**

Issue edit command...   Esc

Compare...

Keystroke recorder

SmartGuides   Create procedure...

Syntax check summary   Create D-specifica...

1. Select options via GUI
2. D-Spec code generated in editor

RPG Definition Specification SmartGuide

Start **Standalone**

Attributes

☐ **Defi_ned like another field (LIKE):** [_____]

Type: **Packed Decimal** ▼ ▲▼

Length: [7] ▲▼ 1 - 30

Decimals: [2] ▲▼ 0 - 7

Array? How many entries (DIM):   [0] ▲▼

Array keywords

Keywords...

Other keywords

☐ **STATIC**   ☐ INZ(*USER)   ☐ **INZ** [_____]

☐ **EXPORT**   ☐ **IMPORT** [_____]

☐ ALTSEQ(*NONE) ☐ **NOOPT**   ☐ **BASED** [_____]

No optimization alt+O

[**<<Previous**] [Next>>] [**Final**] [**Cancel**] [**Help**]

CODE Program Generator

CODE Program Generator

Options Tools Help

Server
OS400

Source
CODELAB/QRPGLESRC(PAYROLL)

List...

Action

Label
CRTBNDRPG

CRTBNDRPG
CRTCBLMOD
CRTCBLPGM
CRTCLMOD
CRTCLPGM
CRTCMD
CRTCMOD
CRTDSPF
CRTICFF
CRTJVAPGM
CRTLF

Command
CRTBNDRPG

Associated profile
ILE RPG Compile/Bind

Add   Change   Remove

Options...

Submit

Submit compile to the iSeries host

Change CRTxxx command options

Compile Option Notebooks IBM®

ILE RPG - Create Bound RPG Program Options ☒

| Program | Compile | Data | Listing/Generation | Activation/Binding |

Compiler Options

Debugging views	*ALL ▼
Authority	*CMDDFT ▼
User profile	*CMDDFT ▼
Target release	*CMDDFT ▼
Optimize	*CMDDFT ▼
Enable performance collection	*FULL ▼
☑ Profiling data	*CMDDFT
Define condition names	*CMDDFT ▼

Add
Delete

```
CRTBNDRPG SRCFILE(&L/&F) SRCMBR(&M) PGM(&L/&M)
REPLACE(*YES) DBGVIEW(*ALL) ENBPFRCOL(*FULL)
```

OK   Cancel   Default   Help

▶ CODE remembers your compile options

CODE Designer

IBM ®

- # Graphical design tool for DDS
  - display files - screens
  - printer files - reports
  - physical files - databases
- # Powerful intuitive interface

  ► **Lets novice create DDS quickly and easily**
  - while giving expert access to all the features of DDS

  ► **WYSIWYG graphical design**
  - Drag/drop ease

  ► **Properties notebook**
  - full power of DDS exposed

  ► **Integrated verifier**
  - Catch all your errors locally

  ► **Explorer-like browsing of DDS hierarchy**

Design Page - WYSIWYG layout IBM®

Tab for each screen/report

Toolbar for visual display and modification of attributes

Drag/Drop from Palette

5>CODELAB/QDDSSRC(MSTDSP) -

File Edit View Insert Selected Tools Help

Details | MAIN_MENU | EMP_SELECT | EMP_MAINT | PRJ_SELECT | PRJ_MAINT | Source | Listing

EMPMNT   ENAME   30   I O B

Ignore all indicators   0

```
----+----1----+----2----+----3----+----4----+--■-5----+----6----+----7----+----8
 1
 2  PRG01              Time Reporting System              MM/DD/YY
 3              Employee Master Maintenance                HH:MM:SS
 4
 5   Number  666666   Name  BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
 6
 7           Category        B
 8           Department      BBBBB
 9           Location        BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
10           USRID           BBBBBBBB
11           Normal week hours  999    g. 40.0 enter 400)
12
13              Time Reporting History
14
15                     Current  Year To  Prior
16                      Month     Date     Year
17     Project Related   66666   6666666  6666666
18     Non Project Related 66666  6666666  6666666
```

5,48

IBM Software

Properties Notebooks

All of the power of DDS is abstracted in an
intuitive highly visual user interface

Windows Explorer for DDS
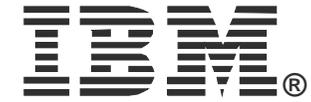
Details page

Settings for WebFacing

DDS Tree

Selected DDS source page

Designer - Program Verify

<OS400>CODELAB/QDDSSRC(MSTDSP) - CODE Designer

File Edit View Insert Selected Tools Help

| Details | MAIN_SCRN | EMPL_SEL | EMPL_INFO | UNTITLED | Source | Listing |

RECORD1

Ignore all indicators

BBBBB BBBBBBBBBB

- <OS400>CODELAB/C
  - File Keywords
  - SELECT
  - EMPSEL
  - EMPMNT
  - PRJSEL
  - PRJMNT
  - RSNSEL
  - RSNMNT
  - RECORD1
    - Record Keywo
    - FIELD1
    - FIELD2
  - MAIN_SCRN
  - EMPL_SEL

| Selected DDS | Error list |

<OS400>CODELAB/QDDSSRC(MSTDSP)

DDS7866W Field FIELD2 overlaps another field with no conditions specified.

The verify of '<OS400>CODELAB/QDDSSRC(MSTDSP)' completed with errors.   7 : 19

Errors highlighted

Error list page

▶ Same DDS verifier as used by editor

Integrated DDS Editor

IBM®

Single click back to design mode

Single click verify

Full power of editor

Integrated error feedback

```
015>CODELAB/QDDSSRC(REFMST) - CODE Design       _ □ ×
  Edit  View  Insert  Selected  Tools  Help

Source | Listing

 Row 13         Column 52      Replace  1 change.
......A..............................Functions++++++++++++++++++
050    A*    TIME REPORTING SYSTEM FILES.  THESE DEFINITIONS WILL BE REFERE
060    A*    BY WHEN CREATING THE SPECIFIC PHYSICAL AND LOGICAL FILES AS WE
070    A*    BY SDA WHEN CREATING DISPLAY FORMATS.
080    A************************************************************
00090  A         R RCREF                          TEXT('DATA BASE REFERENCE')
00100  A*%%TS  DD  19990204  231630  REINHARD   REL-V3R2M2  5763-CL2
00110  A*   COMMON FIELDS
00120  A            ACREC            1    B      TEXT('ACTIVE RECORD CODE')
00130  A                                         COLHDG( ACREC )
00130DDS7508E Closing apostrophe missing for quoted string.
00140  A            DATFL            6    0B      TEXT('DATE FIELD')
```

```
DATE

 DDS7520E Keyword COLHDG ignored because of error in list of values.

 DDS7508E Closing apostrophe missing for quoted string.

The verify of '<T015>CODELAB/QDDSSRC(REFMST)' completed with errors.
```

Debugger Architecture

iSeries

Debug
Server

Debug
Source/Listing
View

5250
Emulation
Window

Job

PGMA

PGMB
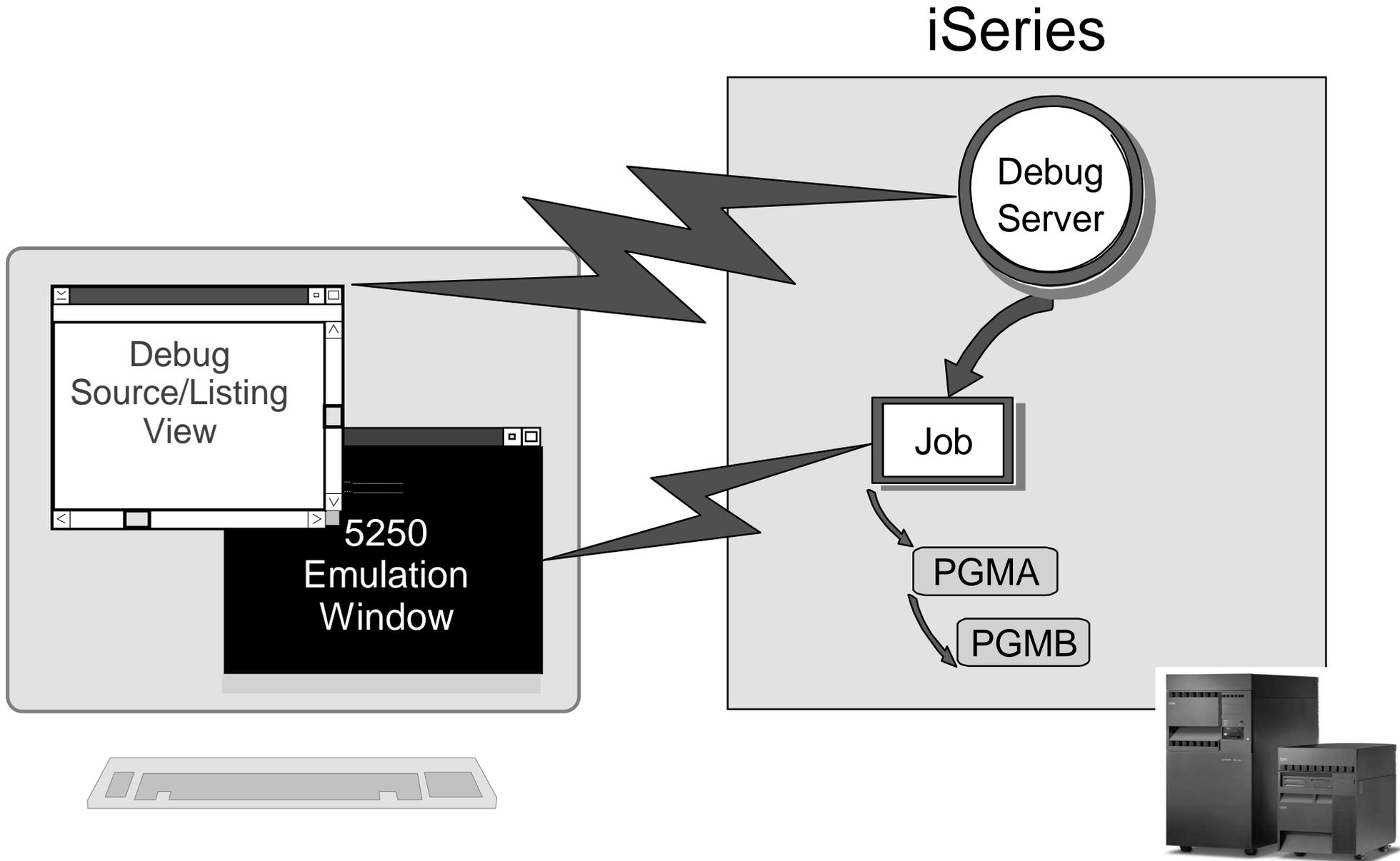
IBM Distributed Debugger

► **RPG, COBOL, CL, C, C++, and Java**

► **Both OPM and ILE; step between them**

► **Multiple breakpoint types**

► **Display and change variables**

► **Source and listing views**

► **Look at call stack**

► **Batch and interactive**

► **Attach to a running application**

► **Application runs on the host**
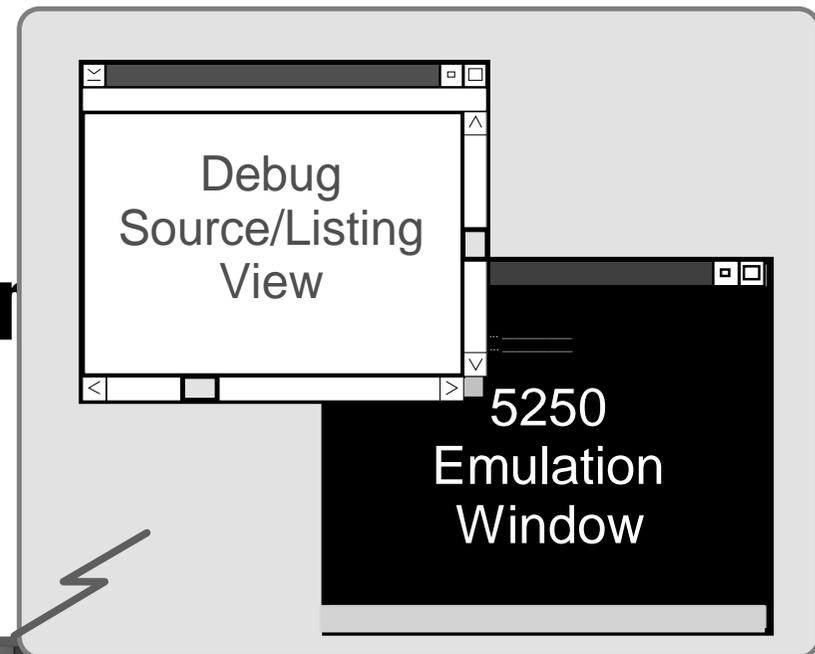
Debug
Source/Listing
View

5250
Emulation
Window

Debugger Window

IBM®

IBM Distributed Debugger

File   View   Selected   Debug   Source   Breakpoints   Monitors   Window   Help

Step Over   Step Debug   Run   Halt   Terminate   Restart

CODELAB01/PAYROLLG:0

Stacks   Breakpoints   Programs

Breakpoints
- Line Breakpoints
  - Source:*PGM   CODELAB01/PAYR
  - Source:*PGM   CODELAB01/PAYR

Monitors   Locals

Expression M...

Source

Thread 1:*PGM   CODELAB01/PAYROLLG

```
47        C                              EXSR      MAIN
48        C                              MOVE      '1'           *INLR
49          * MAIN SUBROUTINE
50        C        MAIN              BEGSR
51        C        BEGIN             TAG
52        C                          MOVE      '0'           *IN60
53        C                          MOVE      *BLANKS       EMESS
54        C                          MOVE      *BLANKS       EMPAPL
55        C                          MOVE      *BLANKS       PRJAPL
56        C                          MOVE      *BLANKS       RSNAPL
57
58              Set Breakpoint    F9      e SELECT format to display.  If end of
59              Run to Location           END TAG; ELSE edit SELECT format.
60        C*
61        C        SELTAG            TAG
62        C                          EXFMT     SELECT
63        C        *INKC             IFEQ      '1'
64        C                          GOTO      END
65        C                          ELSE
66        C                          EXSR      EDITSL
```

| Active breakpoint | Disabled breakpoint | Breakpoint context menu |

IBM Software

Monitoring Variables

monitored variables

Variables context menu

CODE Project Organizer

- ## Like PDM - manages lists. But lists of...
  - iSeries libraries, files, objects, members and fields
  - ADM projects, groups and parts
  - Local Windows files

- ## Not restricted to one type of list
  - E.g.: can list objects, members, local files simultaneously

- ## Pop-up menus for actions
  - Easy access to local and iSeries commands

- ## Easy to create user-defined actions
  - Can use all PDM substitution variables
  - Actions can be iSereis or Windows commands
  - Actions are importable and exportable for teams

- ## Great ADM support
  - and CMS and Turnover integration

CODE Project Organizer

qcodelab - CODE Project Organizer

Project   Filter   Edit   View   Options   Tools   Help

elopment

All filters

- Add Filter
  - AS/400
    - Library...
    - Object...
    - Member...
    - Field...
  - Application Development Manager
  - Local...
- `<>QCODE/EVF* OBJTYPE(*FILE) OBJATTR(SA`
- `<>QCODELAB/*(*)`
  - `<>QCODELAB/QCBLLESRC(*)`
  - `<>QCODELAB/QCLSRC(*)`
  - `<>QCODELAB/QDDSSRC(*)`
  - `<>QCODELAB/QLBLSRC(*)`
  - `<>QCODELAB/QRPGLESRC(*)`
  - `<>QCODELAB/QRPGSRC(*)`
- `<>QCODELAB/* OBJTYPE(*) OBJATTR(*)`

Contents of '<>QCODELAB/*(*)'

Name	Context	Type
CUPDATELE		
EVFDCOMP		
ACTMST		
BRWORD		
CUSMST		
CUSTOMER		
DATADICT		
DISPLAY		
DSPUPDAT		
MENUBAR		
ORDHMST		
ORDREP		
PRINT		
CUPDATE		
COPYFILELE		

Context menu:
- Properties...
- Refresh selected
- Refresh all
- Clear all
- CODE edit
- CODE browse
- CODE compile
- CODE compile...
- CODE debug...
- Get from host
- SEU edit
- SEU browse
- SEU print
- Change type or description...
- PDM find string...
- PDM compare...
- PDM merge...
- Delete member
- Rename member
- Copy source member
- Copy member

`<OS400> dsplibl`

`<OS400>`

`<OS400>QCODELAB/QCBLLESRC(CUPDATELE)`

Filter List   Monitor window   Details list   Context menu

CODE Project Organizer - Actions

CODE Actions

Project | Local Files | AS/400 Members | AS/400 Objects | ADM Projects | ADM Groups | ADM Parts

Actions

CODE edit
CODE browse
CODE compile
CODE compile...
CODE debug...
Get from host
SEU edit
SEU browse
SDA screen design
SEU print
SDA menu design
RLU printer design
RLU print

New action...

Remove | Move up

Edit... | Move down

Selected action details

Command

STRSEU OPTION(2) SRCFILE(&L/&F)
SRCMBR(&N)

☑ Remote command   ☐ Prompt first
☐ Refresh after   ☐ Collect names

OK | Apply | Cancel | Help

Edit source on host using Source Entry Utility

Create your own actions

Edit the predefined actions

Actions list

Action details

CODE Summary
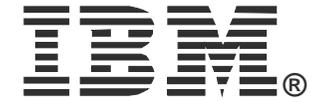
- **IBM's follow-on to SEU, PDM, RLU, SDA**
- **New world, new servers, new tools!**
  - ► Much higher productivity
  - ► Much more fun programming again
  - ► Much easier to attract/retain talent
  - ► Much more flexibility
    - Work at home
    - Tailor extensively to suit your needs
  - ► Much easier transition to future
    - Today: host applications, new tools
    - Tomorrow: Web applications!
      - RPG IV, ILE, GUI, VisualAge, Java, WebSphere. . .

CODE - What you need
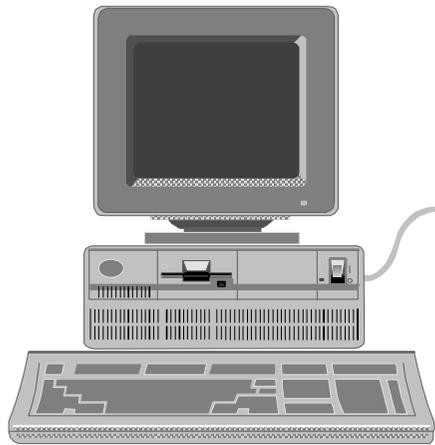
All you need is:

- ► **Windows 98/NT/2000**
- ► **Emulator of choice**
- ► **Web browser to view help**
- ► **JDK 1.2.2**
- ► **Pentium II processor 64MB mem**
- ► **235MB disk**

TCP/IP

Additional Information

IBM ®
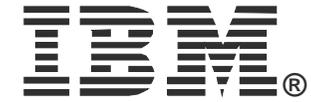
- ## homepage
  - ► www.ibm.com/software/ad/wdt400

- ## Education
  - ► S6186 CODE/400 for iSeries -- Basic (2 days)
  - ► S6205 CODE/400 for iSeries -- Advanced (1 day)

- ## Order number
  - ► V4R5M1: 5769-WDS
  - ► V5R1:   5722-WDS

- ## Newsgroup
  - ► news://news.software.ibm.com/ibm.software.code400

iSeries & WebSphere Resources & Deliverables

iSeries site
www.iseries.ibm.com/

iSeries WebSphere Application Server
http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/

PartnerWorld for Developers, iSeries & WebSphere
http://www.iseries.ibm.com/developer/websphere/

IBM eServer Solutions
http://www-1.ibm.com/servers/eserver/iseries/solutions/

iSeries e-business Solutions
http://www-1.ibm.com/servers/eserver/iseries/ebusiness/

iSeries B2B Solutions
http://www-1.ibm.com/servers/eserver/iseries/btob/

Connect for iSeries
http://www-1.ibm.com/servers/eserver/iseries/btob/connect/v11high.html

WebSphere Commerce Suite for iSeries
http://www-1.ibm.com/servers/eserver/iseries/ebusiness/wcs51.html

iSeries and e-commerce
http://www-1.ibm.com/servers/eserver/iseries/ebusiness/ecommerce.htm

iSeries HTTP Server
http://www-1.ibm.com/servers/eserver/iseries/software/http/index.html

WebSphere Development Studio for iSeries
http://www-3.ibm.com/software/ad/wds400/

iSeries and WebSphere References
http://www.as400.ibm.com/developer/java/solutions/jjem.html
http://www2.software.ibm.com/casestudies/swcsweb.nsf/platform

iSeries Solution Finder
http://www.iseries.ibm.com/btobpartner/

iSeries & Domino
http://www-1.ibm.com/servers/eserver/iseries/domino/

Dedicated Server for Domino
http://www-1.ibm.com/servers/eserver/iseries/domino/dsd.htm

Workload Estimator for iSeries, WAS, WCS & Domino, HTTP Server, Java, etc.
http://as400service.ibm.com/estimator/

iSeries Custom Technology Center
http://www-1.ibm.com/servers/eserver/iseries/service/ctc/

iSeries Technical Support
http://as400service.ibm.com/

iSeries Technical Studio
http://www.as400.ibm.com/tstudio/

1st Install for iSeries & WebSphere Application Server
http://www.iseries.ibm.com/developer/websphere/assistance.html

iSeries ToolsNet (Tools & Middleware)
http://www.iseries.ibm.com/developer/tools/

iSeries & Services Network
http://as400service.ibm.com/supporthome.nsf/document/19251245

iSeries e-business Handbook (SG24-5694-01)
http://www.redbooks.ibm.com/abstracts/sg245694.html

WebSphere Commerce Suite With Back-End Order Mgmt.
http://ibm.com/redbooks

iSeries Technology Center
http://www.iseries.ibm.com/service/itc/ebiz.htm

iSeries University
http://www-3.ibm.com/services/learning/community/as400/

iSeries & WebSphere Resources & Deliverables

WebSphere Application Server Overview
http://www-4.ibm.com/software/webservers/appserv/

WebSphere Commerce Suite
www-4.ibm.com/software/webservers/commerce/

WebSphere Payment Manager
www-4.ibm.com/software/webservers/paymgr/

MQSeries
www.ibm.com/software/ts/mqseries

iSeries & WebSphere Documentation

Redbooks & Red Pieces   **Form Numbers/Web Sites**
    Building iSeries Applications for WebSphere Advanced Edition SG24-5691
    Building Java Applications for the iSeries with VisualAge for Java   SG24-6245
    Integrating WCS with Domino Back-End Applications
·   **http://ibm.com/redbooks (search for REDP0141)**

Java & WebSphere Performance on iSeries
·   **http://publib-b.boulder.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg246256.html?Open**
    iSeries Application Development Directions white paper is now available
·   **http://www.iseries.ibm.com/developer/tools/documents/addir/index.html**
    Connect for iSeries with WebSphere Commerce Suite Red Paper
·   **http://www.redbooks.ibm.com/redpapers/pdfs/redp0127.pdf**

Tools for Application Reface and Redesign
·   **http://www.as400.ibm.com/developer/comm/pidtechpapers.html?Tools**
    Introduction to Enterprise JavaBeans for AS/400   SG24-5192-00
    Web enabling AS/400 Applications with WebSphere Studio   SG24-5634-00
    Building AS/400 Applications with WebSphere Standard Edition 2.0   SG24-5635-00
    Building AS/400 C/S Apps with Java   SG24-2152-02
    Building AS/400 Internet-based applications with Java   SG24-5337-00

IBM Redbooks
http://www.redbooks.ibm.com/

iSeries Nation
http://www-1.ibm.com/servers/eserver/iseries/announce/form.html