

Trevor Perry – Chief Architect. Angus Thinks!

October 2014



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RPG Open Access -- A Developer's Experience



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Abstract



- RPG Open Access (RPGOA) has been called "the future of RPG on IBM i." Yet we have been told there are myths surrounding RPGOA. A standards committee has been established to guide the community to a consistent approach to RPGOA development and communication, but it has yet to gain traction. Looking back to the introduction of RPGOA, the confusion and lack of information persists.
- This session will explain RPG Open Access, starting with a basic explanation and overview. It will describe several actual customer implementations, and theorize on future possible uses for RPGOA. This session will also introduce you to resources on how to build your own RPGOA handlers to extend your existing applications and build modern IBM i applications from scratch.

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What?

- IBM® Rational® Open Access: RPG Edition

<http://www-01.ibm.com/software/rational/products/openaccess/>

Rational Open Access RPG Edition


Access new devices and resources with extensions for RPG applications

IBM® Rational® Open Access RPG Edition provides the runtime enablement for the I/O handlers that are developed to extend ILE RPG I/O capabilities to new resources and devices. It allows programmers to use the simple, well-understood RPG I/O model to access new devices and resources that are not directly supported by RPG. Rational Open Access RPG Edition is a full-featured version of the limited support provided by native RPG SPECIAL files. Rational Open Access RPG Edition software:

- **Accesses multiple devices and resources** such as mobile devices, web services, cloud resources, external databases, XML files and spreadsheets.
- **Supports existing handlers** provided by third parties, including software vendors, business partners, service organizations and open-source software.
- **Takes advantage of existing RPG programming skills** by enabling RPG developers to access the resource or device in their applications using native RPG file specifications and I/O operations.
- **Supports RPG IV language enhancements** including the addition of ILE, which enables you to write modular, reusable code following programming best practices.
- **Is a technology that is now included at no additional charge** with the IBM i RPG compiler and runtime (Rational Open Access RPG Edition was formerly a priced, keyed offering).

System Requirements
This page outlines system requirements for a server running IBM® Rational® Open Access: RPG Edition

For more information:
To learn more about Rational Open Access: RPG Edition V1.1, contact your IBM representative or IBM Business Partner.



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Considering a purchase?

[Email IBM](#)

[Request a quote](#)

Or call us at: 1-800-728-1212
Priority code: 159-IG23W



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Rational Open Access RPG Edition

- Access new devices and resources with extensions for RPG applications
 - IBM® Rational® Open Access RPG Edition provides the runtime enablement for the I/O handlers that are developed to extend ILE RPG I/O capabilities to new resources and devices.
 - It allows programmers to use the simple, well-understood RPG I/O model to access new devices and resources that are not directly supported by RPG. Rational Open Access RPG Edition is a full-featured version of the limited support provided by native RPG SPECIAL files.

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Rational Open Access RPG Edition software:

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- Accesses multiple devices and resources
 - such as mobile devices, web services, cloud resources, external databases, XML files and spreadsheets.
- Supports existing handlers provided by third parties
 - including software vendors, business partners, service organizations and open-source software.
- Takes advantage of existing RPG programming skills
 - by enabling RPG developers to access the resource or device in their applications using native RPG file specifications and I/O operations.
- Supports RPG IV language enhancements
 - including the addition of ILE, which enables you to write modular, reusable code following programming best practices.
- Is a technology that is now included at no additional charge
 - with the IBM i RPG compiler and runtime (Rational Open Access RPG Edition was formerly a priced, keyed offering)

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My First Experience

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- Customer using a refacing/repurposing tool
 - 5250 for OS and existing programs
 - OA version for handler
- Decided on RPG Open Access solution
- Found a recently written program
 - Installed the handler
- Started the solution
- Signed on
- Navigated to the program
- Nothing looks different!

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5250 refaced

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The screenshot shows a web browser window with the URL `C:\looksoftware.9.0\@UDX\SmartFrame\SmartFrame.htm`. The application header includes the 'smartclient' logo. On the left, there are buttons for 'Add' and 'Spool file'. The main content area is titled 'Work With Movies' and contains the text 'Enter option, press Enter.' Below this, there are two input fields for 'Display releases from' and 'to'. A table of movie releases is displayed below the filters.

Opt	Movie Name	Company	Rel Date	Status
	Crocodile Dundee	RtnFire Films	01/01/40	On DVD
	Cyrano de Bergerac	Meridienne	24/06/20	On DVD
	William Shakespeare	The Shakespeare Cpany	02/01/03	On DVD
	Ken Follett	Dutton	20/03/10	On DVD
	Leonardo da Vinci	Joconde	15/01/10	Filming
	Harry Potter	Rowling and Mary	23/03/10	Filming
	Toy Story 1	Disney-Pixar	01/01/40	Filming
	Toy Story 2	Disney-Pixar	14/06/08	Filming
	Toy Story 3	Disney-Pixar	12/03/09	Filming
	Mike wants you	Disney-Pixar	14/01/10	In Theatres
	Cloudy with a Chance of M	Disney-Pixar	26/11/09	On DVD
	Shrek	DreamWorks	17/02/10	Filming
	Shrek 2	DreamWorks	17/02/10	Filming

Buttons for 'Exit' and 'OK' are located at the bottom right of the table area.

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RPG OA

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This screenshot is identical to the one above, showing the 'Work With Movies' application interface. The table of movie releases is the same, but the 'Rel Date' column shows different values for the first two rows: '1/01/40' for 'Crocodile Dundee' and '24/06/20' for 'Cyrano de Bergerac'. The rest of the table and interface elements are identical to the previous screenshot.


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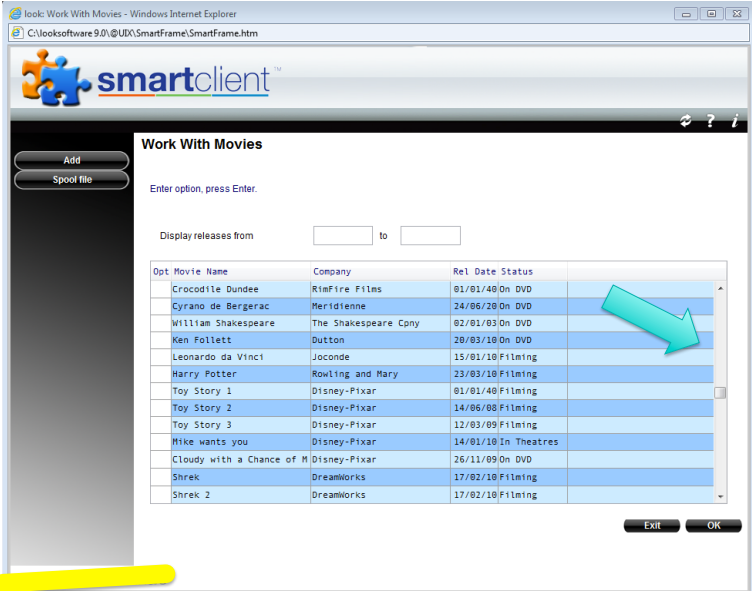
What happened?

- Subfile delivered to the client
 - 5250: One page at a time
 - RPGOA: The entire list
- Client's built in grid sorting functionality
 - 5250: One page at a time
 - RPGOA: The entire list
- Date fields turned into combos

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5250 refaced



Work With Movies

Enter option, press Enter.

Display releases from to

Opt	Movie Name	Company	Rel. Date	Status
	Crocodile Dundee	RtnFire Films	01/01/40	On DVD
	Cyrano de Bergerac	Meridienne	24/06/20	On DVD
	William Shakespeare	The Shakespeare Cpany	02/01/03	On DVD
	Ken Follett	Dutton	20/03/10	On DVD
	Leonardo da Vinc1	Joconde	15/01/10	Filming
	Harry Potter	Rowling and Mary	23/03/10	Filming
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	Toy Story 2	Disney-Pixar	14/06/08	Filming
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	Mike wants you	Disney-Pixar	14/01/10	In Theatres
	Cloudy with a Chance of M	Disney-Pixar	26/11/09	On DVD
	Shrek	DreamWorks	17/02/10	Filming
	Shrek 2	DreamWorks	17/02/10	Filming

EXIT OK

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RPG OA

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look: Work With Movies - Windows Internet Explorer
C:\looksoftware 9.0\@UD\SmartFrame\SmartFrame.htm

smartclient™

Work With Movies

Add
Spool file

Enter option, press Enter.

Display releases from [] to []

Opt Movie Name	Company	Rel Date	Status
Fargo	Universal	31/05/96	On DVD
Top Gun	Paramount Pictures	31/07/86	On DVD
American Beauty	Miramax	4/02/00	On DVD
Terminator 2	CarolCo Pictures	5/10/91	On DVD
Shrek The Third	DreamWorks	7/06/07	On DVD
Transformers 3 : Dark of	Paramount	1/07/11	In Theatres
Mike wants you	Disney-Pixar	14/01/10	In Theatres
Toy Story 1	Disney-Pixar	1/01/40	Filming
Toy Story 3	Disney-Pixar	12/03/09	Filming
Toy Story 2	Disney-Pixar	14/06/08	Filming
Leonardo da Vincit	Joconde	15/01/10	Filming
Shrek	DreamWorks	17/02/10	Filming
Shrek 2	DreamWorks	17/02/10	Filming

EXIT OK

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5250 refaced

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look: Work With Movies - Windows Internet Explorer
C:\looksoftware 9.0\@UD\SmartFrame\SmartFrame.htm

smartclient™

Work With Movies

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Display releases from [] to []

Opt Movie Name	Company	Rel Date	Status
Crocodile Dundee	RtnFire Films	01/01/40	On DVD
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Ken Follett	Dutton	20/03/10	On DVD
Leonardo da Vincit	Joconde	15/01/10	Filming
Harry Potter	Rowling and Mary	23/03/10	Filming
Toy Story 1	Disney-Pixar	01/01/40	Filming
Toy Story 2	Disney-Pixar	14/06/08	Filming
Toy Story 3	Disney-Pixar	12/03/09	Filming
Mike wants you	Disney-Pixar	14/01/10	In Theatres
Cloudy with a Chance of M	Disney-Pixar	26/11/09	On DVD
Shrek	DreamWorks	17/02/10	Filming
Shrek 2	DreamWorks	17/02/10	Filming

EXIT OK

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RPG OA

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look: Work With Movies - Windows Internet Explorer
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smartclient™

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Top Gun	Paramount Pictures	31/07/86	On DVD
American Beauty	Miramax	4/02/00	On DVD
Terminator 2	CarolCo Pictures	5/10/91	On DVD
Shrek The Third	DreamWorks	7/06/07	On DVD
Transformers 3 : Dark of	Paramount	1/07/11	In Theatres
Mike wants you	Disney-Pixar	14/01/10	In Theatres
Toy Story 1	Disney-Pixar	1/01/40	Filming
Toy Story 3	Disney-Pixar	12/03/09	Filming
Toy Story 2	Disney-Pixar	14/06/08	Filming
Leonardo da Vinci	Joconde	15/01/10	Filming
Shrek	DreamWorks	17/02/10	Filming
Shrek 2	DreamWorks	17/02/10	Filming

EXIT OK

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5250 refaced

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look: Work With Movies - Windows Internet Explorer
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smartclient™

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Enter option, press Enter.

Display releases from [] to []

Opt Movie Name	Company	Rel Date	Status
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Toy Story 1	Disney-Pixar	01/01/40	Filming
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EXIT OK

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look: Work With Movies - Windows Internet Explorer
C:\looksoftware 9.0.\@UIX\SmartFrame\SmartFrame.htm

smartclient

Work With Movies

Add
Spool file

Enter option, press Enter.

Display releases from

Opt Movie Name	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Date	Status
Fargo	29	30	1	2	3	4	5	/960n	DVD
Top Gun	6	7	8	9	10	11	12	/860n	DVD
American Beauty	13	14	15	16	17	18	19	/860n	DVD
Terminator 2	20	21	22	23	24	25	26	/910n	DVD
Shrek The Third	27	28	29	30	31	1	2	/070n	DVD
Transformers 3 : Dark of	3	4	5	6	7	8	9	/11In	Theatres
Mike wants you	Today: 20/10/13							/10In	Theatres
Toy Story 1	Disney-Pixar						1/01/40	Filing	
Toy Story 3	Disney-Pixar						12/03/09	Filing	
Toy Story 2	Disney-Pixar						14/06/08	Filing	
Leonardo da Vinci	Joconde						15/01/10	Filing	
Shrek	Dreamworks						17/02/10	Filing	
Shrek 2	Dreamworks						17/03/10	Filing	

EXIT OK

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What was the benefit?

- RPG code to sort the list no longer needed
 - Reduced maintenance
- Response time – different paradigm

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What was the cost?

- RPG code to sort the list no longer needed
- Existing RPG programs did not work with OA handler
 - One-page-replace subfile coding technique

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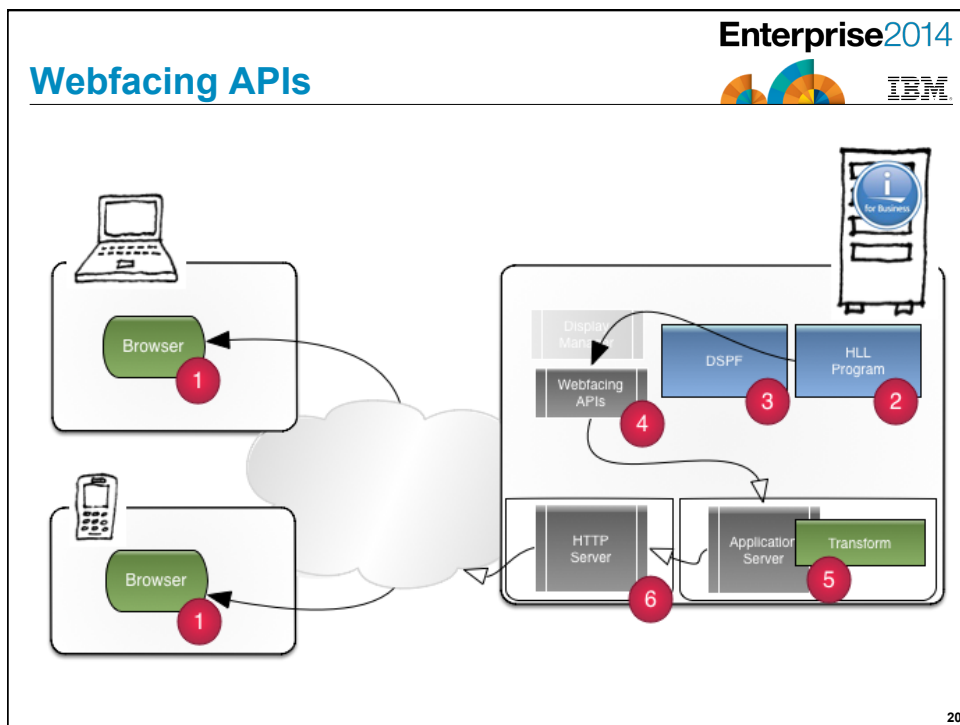
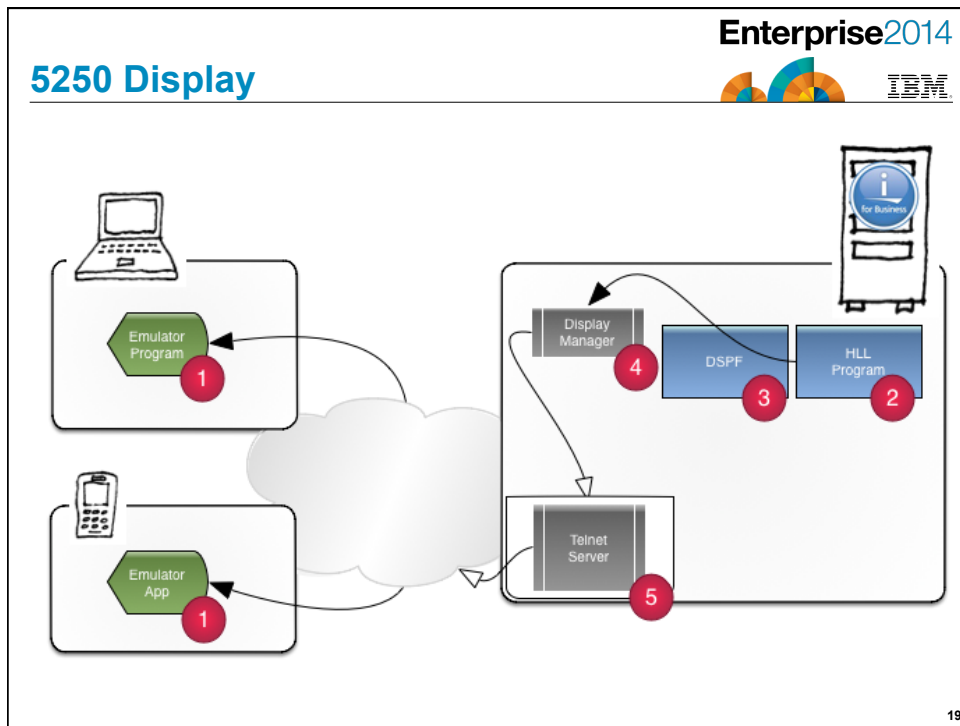


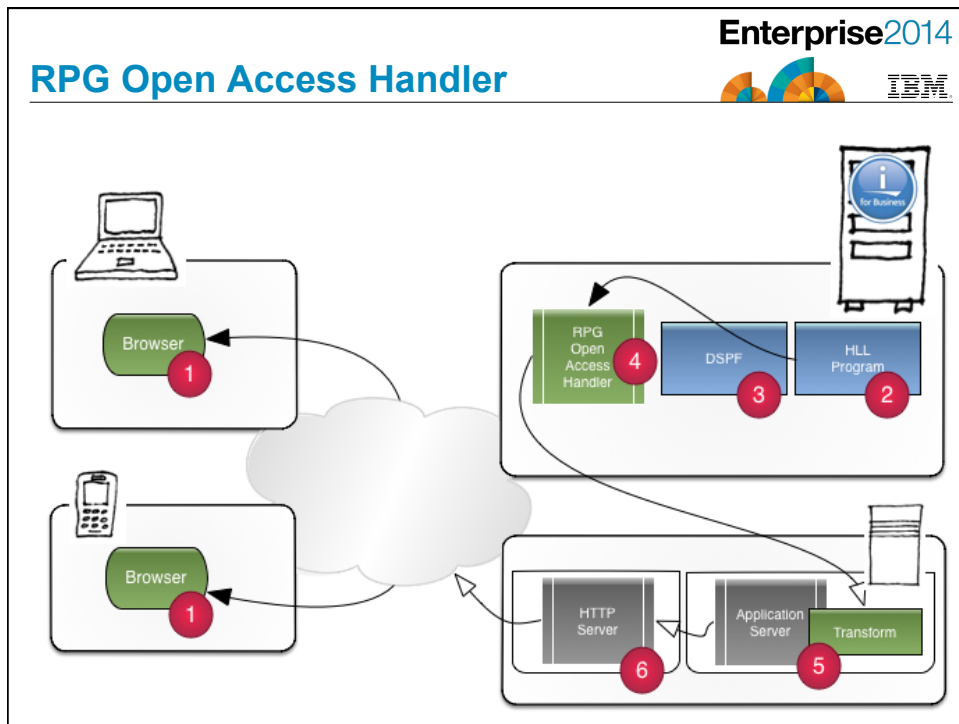
Anti-climax!

- ONE line of code..

```
FDisplay UF E WORKSTN  
F HANDLER ('handler-program')
```

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What else?

- Drop down combo boxes
 - List built inside RPG program
- Maps, Images, Links
 - Collect data from inside RPG program
- More data
 - Not limited to the size of 24x80 or 27x132 data stream

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What else?

- Separation of application and user interface
 - Don't need data collection at glass
 - Extend the application with existing RPG & SQL skills
- How?
 - Fields added to the DDS
 - Can be H(idden) fields
 - Handler can manage more data/fields
 - DDS directive connects fields to GUI properties

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Who does it?

- Replace 5250 data stream
 - Profound
 - looksoftware
 - ASNA
 - Rocket

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That's it?

- NO!
- The power of RPG Open Access is purported to be in replacing the 5250 data stream
- Vendors have focused on user interface
- Press has focused on vendor focus
- Vendors are suggesting there are myths

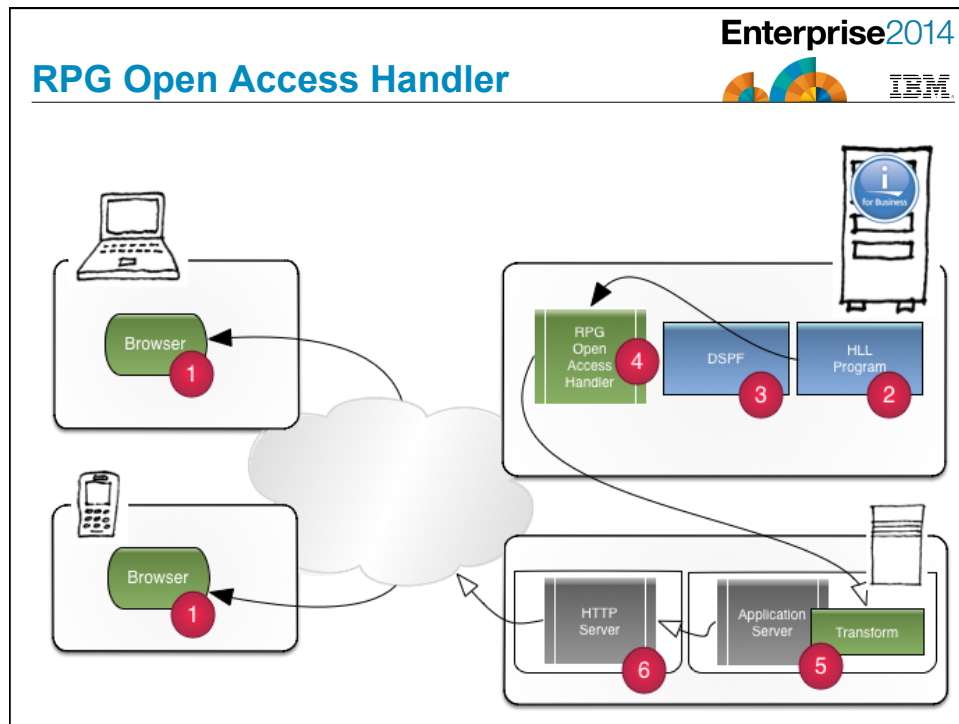
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Rational Open Access RPG Edition

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So...

- RPG Open Access cannot replace 5250 completely
 - Operating system screens
 - Older green screen applications
 - No source
 - No maintenance allowed
- RPG Open Access for 5250 must be hybrid
- Building your own is complicated
 - Can be done, but...
 - Individual or generic?

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Who does it? – part 2!

- Replace 5250 data stream - **devices**
 - Profound
 - looksoftware
 - ASNA
 - Rocket

- Something else? - **resources**
 - RJS
 - Rocket

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RJS Special Report

A System *INEWS* Special Report

Open Access for RPG Special Report: What It Is, How It Works, and Hands-On Experience

by Vern Hamberg


It was the best of ideas; it was the worst of ideas (apologies to Mr. Dickens). Response to IBM's announcement of IBM Rational Open Access: RPG Edition (RPG OA) has certainly run the gamut of these extremes. One may well ask what opportunities are now available to an IBM i shop—and should we step through the door to the future that Open Access for RPG sets before us?

Here we will look at what Open Access is and how the IBM i community has responded to it. We will pursue possible uses for this new technology, as well as what is being done already. Then I will relate my own experience of writing an Open Access handler. Finally, I'll cover the key considerations for deciding whether to adopt Open Access in your shop.

a service program. The HANDLER keyword can be used for any RPG device—DISK, PRINTER, or WORKSTN. The provider of the handler chooses which RPG device type best fits the purposes of the handler. Most of the attention to date has focused on user interface modernization, which corresponds best to WORKSTN files. On the other hand, consuming a Web service could be implemented as a CHAIN to a DISK file, while writing to spreadsheets may correspond to PRINTER files.

Open Access does not itself have any handlers; rather, it is the glue between an RPG program and an Open Access handler. When the RPG program performs a file operation, the RPG runtime calls the handler instead of the system data management function it would normally call.


http://www.rjssoftware.com/RJS/media/RJS-Media-Library/RPG_SpecialRpt_1104.pdf

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RJS Special Report

- With RPG OA, RPG programmers are able to use simple and familiar RPG I/O operations to access devices and resources that RPG was not originally designed to support using its I/O model.
 - These resources include:
 - Browsers
 - Mobile devices
 - Web services
 - XML files
 - External databases
 - Spreadsheets
 - Devices and resources yet unknown

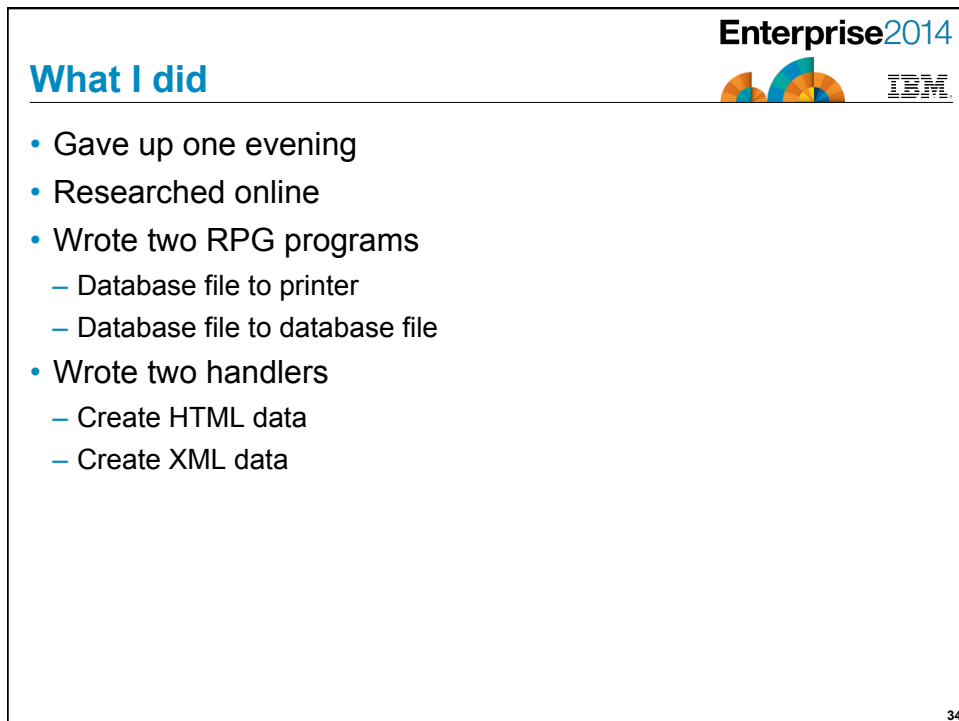
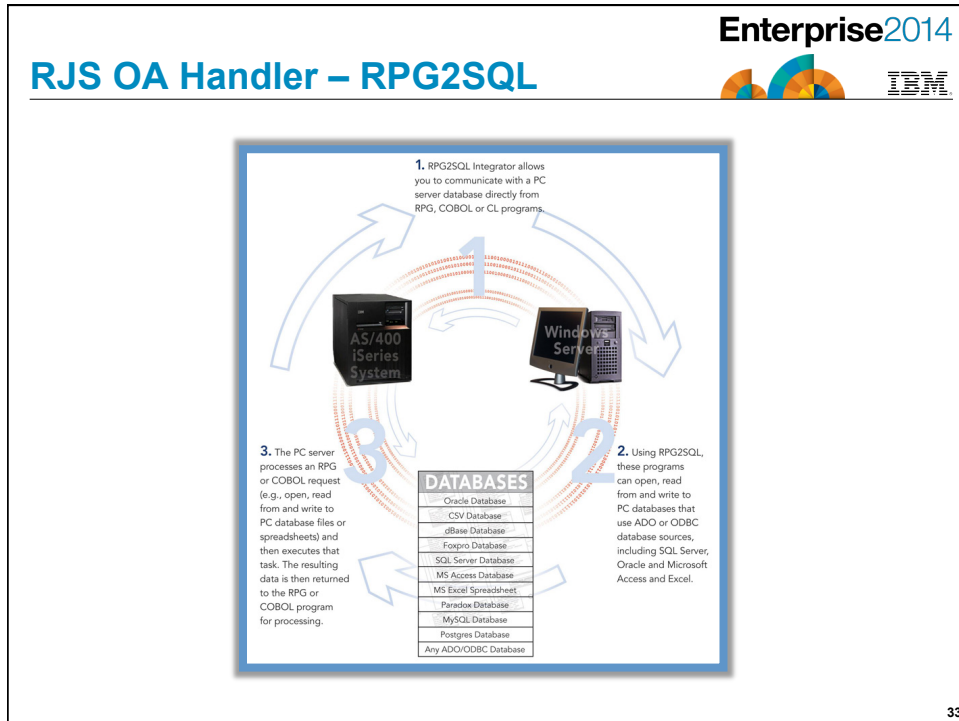
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RJS Special Report

- The design of an Open Access application starts with these elements:
 - An RPG program that uses standard I/O code
 - A resource or device which the RPG program will utilize in some way
- The component that binds these elements together is the handler.

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Resources

- Home page
 - <http://www-01.ibm.com/software/rational/products/openaccess>

- Prerequisites
 - RPG Open Access
 - <http://tinyurl.com/rpg-oar-ptfs>
 - DB2 For i latest group PTFs
 - <https://www.ibm.com/developerworks/ibmi/techupdates/db2>


- Developer Works – RPG Café
 - <http://tinyurl.com/rpg-open-access>

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Documentation

<http://pic.dhe.ibm.com/infocenter/series/v7r1m0/topic/books/rzasm.pdf>



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Resources

- IBM Systems Magazine – RPG
 - <http://www.ibmssystemsmag.com/ibmi/developer/rpg>
 - Jon Paris and Susan Gantner

 - July 2010: Getting a Handle on RPG's Open Access
 - <http://partner400.com/examples/openaccessexample1.htm>
 - November 2012: RPG Open Access Revisited
 - December 2012: Implementing Open Access With RPG
 - January 2013: Handling Input Handlers With RPG Open Access


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Resources

- iPro Developer
 - Rational Open Access: RPG Edition Workshop
 - Craig Pelkie
 - January 2013: Part 1
 - <http://iprodeveloper.com/application-development/rational-open-access-rpg-edition-workshop-part-1>
 - March 2013: Part 2
 - <http://iprodeveloper.com/application-development/rational-open-access-rpg-edition-workshop-part-2>
 - May 2013: Part 3
 - <http://iprodeveloper.com/rpg-programming/rational-open-access-rpg-edition-workshop-part-3>

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Movies DB2 file

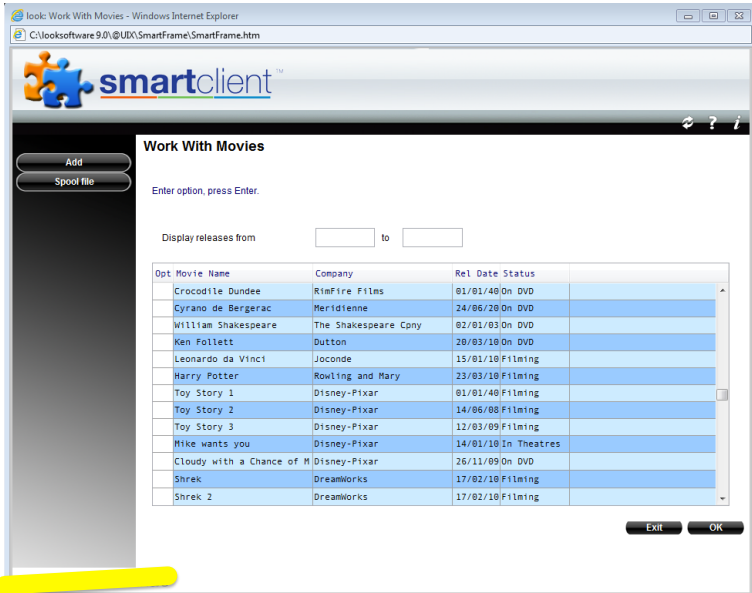
```

fmovie      IF      E          DISK
flist001    O      E          PRINTER
/free
  read movier;
  dow not %eof;
    write outfmt;
    read movier;
  enddo;
*inlr = *on;
/end-free
    
```

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Movies Application



Work With Movies

Enter option, press Enter.

Display releases from to

Opt	Movie Name	Company	Rel Date	Status
	Crocodile Dundee	RtnFire Films	01/01/40	On DVD
	Cyrano de Bergerac	Merldienne	24/06/20	On DVD
	William Shakespeare	The Shakespeare Cpany	02/01/03	On DVD
	Ken Follett	Dutton	20/03/10	On DVD
	Leonardo da Vinc1	Joconde	15/01/10	Filming
	Harry Potter	Rowling and Mary	23/03/10	Filming
	Toy Story 1	Disney-Pixar	01/01/40	Filming
	Toy Story 2	Disney-Pixar	14/06/08	Filming
	Toy Story 3	Disney-Pixar	12/03/09	Filming
	Mike wants you	Disney-Pixar	14/01/10	In Theatres
	Cloudy with a Chance of M	Disney-Pixar	26/11/09	On DVD
	Shrek	DreamWorks	17/02/10	Filming
	Shrek 2	DreamWorks	17/02/10	Filming

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List program 1

```
fmovie      IF   E           DISK
flist001    O   E           PRINTER
/free
  read movier;
  dow not %eof;
    write outfmt;
    read movier;
  enddo;
*inlr = *on;
/end-free
```


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List printer file 1

```
A           REF (MOVIE)
A           R  OUTFMT      SPACEB (1)
A           MOVNAME      R      1
A           MOVIMG       R      +2
```

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List 1 output

```

Display Spooled File
File . . . . . : LIST001                Page/Line  1/2
Control . . . . .                Columns    1 - 78
Find . . . . .
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...
Crocodile Dundee                  CrocodileDundee.jpg
William Shakespeare                Shakespeare.jpg
Ken Follett                        KenFollett.jpg
Leonardo da Vinci                 LeonardoDaVinci.jpg
Harry Potter                      HarryPotter.jpg
Toy Story 1                       ToyStory1.jpg
Toy Story 2                       ToyStory2.jpg
Toy Story 3                       ToyStory3.jpg
Mike wants you                    Mike.jpg
Cloudy with a Chance of Meatballs  Cloudy.jpg
Shrek                              Shrek.jpg
Shrek 2                            Shrek2.jpg
Shrek The Third                   Shrek3.jpg
Shrek Forever After               ShrekForeverAfter.jpg
Robin Hood                        RobinHood.jpg
The Princess Bride                ThePrincessBride.jpg
More...
F3=Exit  F12=Cancel  F19=Left  F20=Right  F24=More keys

```

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List program 2

```

fmovie      IF  E          DISK
flist002  O  E          DISK
/free
  read movier;
  dow not %eof;
    write outfmt;
    read movier;
  enddo;
  *inlr = *on;
/end-free

```

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List DB2 output file 2

```

A                                REF (MOVIE)
A          R OUTFMT
A          MOVNAME      R
A          MOVIMG       R
    
```

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List 1 output

```

Display Report
                                Report width . . . . . : 102
Position to line . . . . .      Shift to column . . . . .
Line  . . . . .1 . . . . .2 . . . . .3 . . . . .4 . . . . .5 . . . . .6 . . . . .7 . .
      Movie Name                               Cover img
000001 Crocodile Dundee                       CrocodileDundee.jpg
000002 William Shakespeare                     Shakespeare.jpg
000003 Ken Follett                             KenFollett.jpg
000004 Leonardo da Vinci                       LeonardoDaVinci.jpg
000005 Harry Potter                           HarryPotter.jpg
000006 Toy Story 1                             ToyStory1.jpg
000007 Toy Story 2                             ToyStory2.jpg
000008 Toy Story 3                             ToyStory3.jpg
000009 Mike wants you                          Mike.jpg
000010 Cloudy with a Chance of Meatballs       Cloudy.jpg
000011 Shrek                                   Shrek.jpg
000012 Shrek 2                                 Shrek2.jpg
000013 Shrek The Third                         Shrek3.jpg
000014 Shrek Forever After                     ShrekForeverAfter.jp
000015 Robin Hood                             RobinHood.jpg
000016 The Princess Bride                     ThePrincessBride.jpg
                                                More...
F3=Exit      F12=Cancel      F19=Left      F20=Right      F21=Split
    
```

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DB2 output file for HTML



```
CREATE TABLE OALIB.HTMLOUT
( HTML VARCHAR(1024) CCSID 37 NOT NULL DEFAULT '' )
RCDFMT HTMLFMT;

LABEL ON TABLE OALIB.HTMLOUT
IS 'HTML OUTPUT FILE';
```

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DB2 output file for XML



```
CREATE TABLE OALIB.XMLOUT
( XML VARCHAR(1024) CCSID 37 NOT NULL DEFAULT '' )
RCDFMT XMLFMT;

LABEL ON TABLE OALIB.XMLOUT
IS 'XML OUTPUT FILE';
```

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Handler for HTML



```

QOA.useNamesValues = '1';
pQOAdata = QOA.namesValues;
HTML +=tagRowStart;
For fieldNum = 1 to QOAdata.num;
  pFieldValue = QOAdata.field(fieldNum).value;
  fieldLength = QOAdata.field(fieldNum).valueLenBytes;
  HTML += tagColStart
    + %trimr(%subst(fieldValue: 1: fieldLength))
    + tagColEnd;
EndFor;
HTML += tagRowEnd;
write htmlfmt;

```

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Handler for XML



```

QOA.useNamesValues = '1';
pQOAdata = QOA.namesValues;
XML = tagRowStart;
For fieldNum = 1 to QOAdata.num;
  pFieldValue = QOAdata.field(fieldNum).value;
  fieldName = QOAdata.field(fieldNum).externalName;
  fieldLength = QOAdata.field(fieldNum).valueLenBytes;
  XML += tagElmStart + %trimr(fieldName) + tagElmBack
    + %trimr(%subst(fieldValue: 1: fieldLength))
    + tagElmEnd + %trimr(fieldName) + tagElmBack;
EndFor;
XML += tagRowEnd;
write XMLfmt;

```

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List program 1

```

Fmovie      IF  E          DISK
Flist001    O   E          PRINTER
F          handler('HDLR_HTML')
/free
  read movier;
  dow not %eof;
    write outfmt;
    read movier;
  enddo;
*inlr = *on;
/end-free

```

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List program 2

```

Fmovie      IF  E          DISK
Flist001    O   E          DISK
F          handler('HDLR_XML')
/free
  read movier;
  dow not %eof;
    write outfmt;
    read movier;
  enddo;
*inlr = *on;
/end-free

```

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XMLOUT

```

<movies>
  <movie>
    <MOVNAME>Crocodile Dundee</MOVNAME>
    <MOVIMG>CrocodileDundee.jpg</MOVIMG>
  </movie>
  <movie>
    <MOVNAME>William Shakespeare</MOVNAME>
    <MOVIMG>Shakespeare.jpg</MOVIMG>
  </movie>
  <movie>
    <MOVNAME>Ken Follett</MOVNAME>
    <MOVIMG>KenFollett.jpg</MOVIMG>
  </movie>
  ...
</movies>

```

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HTMLOUT

```

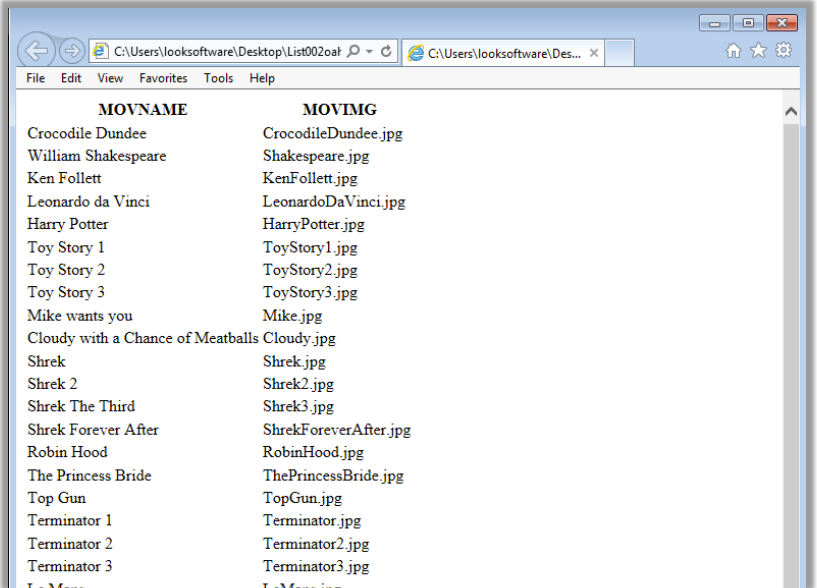
<table>
<thead><tr><th>MOVNAME</th><th>MOVIMG</th></tr></thead>
<tbody><tr><td>Crocodile Dundee</td><td>CrocodileDundee.jpg</td></tr>
<tr><td>William Shakespeare</td><td>Shakespeare.jpg</td></tr>
<tr><td>Ken Follett</td><td>KenFollett.jpg</td></tr>
<tr><td>Leonardo da Vinci</td><td>LeonardoDaVinci.jpg</td></tr>
<tr><td>Harry Potter</td><td>HarryPotter.jpg</td></tr>
<tr><td>Toy Story 1</td><td>ToyStory1.jpg</td></tr>
<tr><td>Toy Story 2</td><td>ToyStory2.jpg</td></tr>
<tr><td>Toy Story 3</td><td>ToyStory3.jpg</td></tr>
<tr><td>Mike wants you</td><td>Mike.jpg</td></tr>
  ...
</tbody></table>

```

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HTMLOUT



The screenshot shows a web browser window with a table of movie names and their corresponding image files. The table has two columns: MOVNAME and MOVIMG. The browser's address bar shows the file path: C:\Users\looksoftware\Desktop\List002oaf. The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The page number 55 is visible in the bottom right corner.

MOVNAME	MOVIMG
Crocodile Dundee	CrocodileDundee.jpg
William Shakespeare	Shakespeare.jpg
Ken Follett	KenFollett.jpg
Leonardo da Vinci	LeonardoDaVinci.jpg
Harry Potter	HarryPotter.jpg
Toy Story 1	ToyStory1.jpg
Toy Story 2	ToyStory2.jpg
Toy Story 3	ToyStory3.jpg
Mike wants you	Mike.jpg
Cloudy with a Chance of Meatballs	Cloudy.jpg
Shrek	Shrek.jpg
Shrek 2	Shrek2.jpg
Shrek The Third	Shrek3.jpg
Shrek Forever After	ShrekForeverAfter.jpg
Robin Hood	RobinHood.jpg
The Princess Bride	ThePrincessBride.jpg
Top Gun	TopGun.jpg
Terminator 1	Terminator.jpg
Terminator 2	Terminator2.jpg
Terminator 3	Terminator3.jpg


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XML Handler description

- Parameters
- Operation
- Field names/values

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Entry parameters


```

/copy QOAR/QRPGLESRC,QRNOPENACC

D QOA          ds          likeds (QrnOpenAccess_T)

C      *ENTRY      PLIST
C          PARM          QOA
  
```

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Operation


```

/copy QOAR/QRPGLESRC,QRNOPENACC

D QOA          ds          likeds (QrnOpenAccess_T)
D opcode       s          like (QOA.rpgOperation)

opcode = QOA.rpgOperation;
if opcode = QrnOperation_OPEN;
  open XMLOUT;
  XML = tagTableStart;
  write XMLfmt;
  return;
EndIf;
  
```


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Operations

- QrnOperation_CHAIN
- QrnOperation_CLOSE
- QrnOperation_DELETE
- QrnOperation_EXFMT
- QrnOperation_FEOD
- QrnOperation_OPEN
- QrnOperation_READ
- QrnOperation_READC
- QrnOperation_READE
- QrnOperation_READP
- QrnOperation_READPE
- QrnOperation_SETGT
- QrnOperation_SETLL
- QrnOperation_UNLOCK
- QrnOperation_UPDATE
- QrnOperation_WRITE
- QrnOperation_DELETE_CURRENT
- QrnOperation_READE_CURRENT
- QrnOperation_READPE_CURRENT
- QrnOperation_POSITION_START
- QrnOperation_POSITION_END

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Documentation



<http://pic.dhe.ibm.com/infocenter/iseres/v7r1m0/topic/books/rzasm.pdf>

IBM

IBM i
Rational Open Access: RPG Edition
1.1



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Field Names/Values



```

/copy QOAR/QRPGLESRC,QRNOPENACC
D QOA                ds                likeds(QrnOpenAccess_T)
D QOAdata            ds                likeds(QrnNamesValues_T)
D                                                            based(pQOAdata)

QOA.useNamesValues = '1';
pQOAdata = QOA.namesValues;
XML = tagRowStart;
For fieldNum = 1 to QOAdata.num;
  pFieldValue = QOAdata.field(fieldNum).value;
  fieldName   = QOAdata.field(fieldNum).externalName;
  fieldLength = QOAdata.field(fieldNum).valueLenBytes;
  XML += tagElmStart + %trimr(fieldName) + tagElmBack
        + %trimr(%subst(fieldValue: 1: fieldLength))
        + tagElmEnd + %trimr(fieldName) + tagElmBack;
EndFor;

```

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What next?

- Write some handler code!
 - Output
 - Input
- Make some decisions
 - Generic handler
 - Specific handler
- Investigate
 - Third-party handlers

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XML Handler

```
H option(*srcstmt : *nodebugio)
```

```
H dftactgrp(*no)
```

```
fxmlout      O      E              DISK      usropn
```

```
  /copy QOAR/QRPGLESRC,QRNOOPENACC
```

```
D QOA          ds          likeds(QrnOpenAccess_T)
D QOAdata      ds          likeds(QrnNamesValues_T)
D              based(pQOAdata)
D opcode       s           like(QOA.rpgOperation)
D fieldValue  s           32470a Based(pFieldValue)
D fieldName   s           10
D fieldNum    s           10  0
D fieldLength s           10  0
```




XML Handler

```

d tagTableStart      c      '<movies>'
d tagTableEnd        c      '</movies>'
d tagRowStart        c      '<movie>'
d tagRowEnd          c      '</movie>'
d tagElmStart        c      '<'
d tagElmEnd          c      '</'
d tagElmBack         c      '>'

```

```

C      *ENTRY          PLIST
C                                PARM                                QOA

```

```
/free
```

```
XML = '';
```

```
QOA.useNamesValues = '1';
```



XML Handler

```
opcode = QOA.rpgOperation;
if opcode = QrnOperation_WRITE;
  pQOAdata = QOA.namesValues;
  XML = tagRowStart;
  For fieldNum = 1 to QOAdata.num;
    pFieldValue = QOAdata.field(fieldNum).value;
    fieldName    = QOAdata.field(fieldNum).externalName;
    fieldLength  = QOAdata.field(fieldNum).valueLenBytes;
    XML += tagElmStart + %trimr(fieldName) + tagElmBack
        + %trimr(%subst(fieldValue: 1: fieldLength))
        + tagElmEnd + %trimr(fieldName) + tagElmBack;
  EndFor;
  XML += tagRowEnd;
  write XMLfmt;
  return;
EndIf;
```



XML Handler

```
if opcode = QrnOperation_OPEN;
  open XMLOUT;
  XML = tagTableStart;
  write XMLfmt;
  return;
EndIf;
if opcode = QrnOperation_CLOSE;
  XML = tagTableEnd;
  write XMLfmt;
  close XMLOUT;
  return;
EndIf;

return;
/end-free
```