Top 10 "Gotchas" for Admins in Upgrading to V6R1

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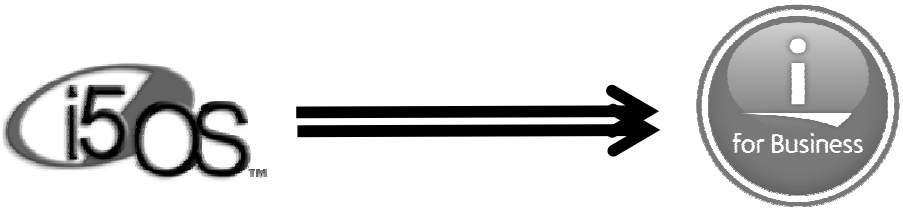
Why Are We Here?

- We're gonna talk about ugprades. What did you think?
- First we'll discuss the process briefly and then we'll "discuss" my top 10 list of things to watch out for.
- Please ask questions throughout because I've done so many upgrades that sometimes I forget about some little details that you might not be familiar with.



V5R4 → 6.1

Process - Block Overview

- 1) Discuss with your vendors and get updates and keys.
- 2) Run the object conversion reports
- 3) Remediate (or plan to) errors from the reports
- 4) Apply PTFs required and all PTFs perm
- 5) Accept license agreements
- 6) BACKUP
- 7) Upgrade
- 8) Post upgrade PTFs
- 9) Object Conversion
- 10) BACKUP

Acronyms

- ASMI – Advanced Systems Management Interface
- CEC – Complex Electronics Cabinet (aka System unit)
- COD – Capacity on Demand
- CUOD – Customer Upgrade on Demand
- DHCP – Dynamic Host Configuration Protocol
- FSP – Flexible Service Processor
- HMC – Hardware Management Console
- HSL – High Speed Loop/Link
- IVM – Integrated Virtualization Manager
- SLIC/LIC – System Licensed Internal Code
- VPM – Virtual Partition Manager
- VMI – Virtual Media Interface
- WEBSM – Web Systems Manager

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Hardware

- You may think this is a software presentation (and it is) however you can't run software without hardware!
- Sooo, the first thing you need to check is your hardware.
- Table stakes for i 6.1 is the Feb 2003 hardware level.
- You may need to dump some old hardware components as well.
- Detail:

The Server

- The following machines will support i 6.1
  - i800, i810, i825, i870, i890
    - i 6.1 is the final release for these machines.
  - Any POWER5, POWER5+ or POWER6 machine.
  - Blade Center "S" models with JS12 or JS22 blades.
    - However a JS22 blade isn't a great investment in a BCS
  - Blade Center "H" models with JS12 or JS22 blades.
- You will need a minimum of a 17GB Load Source disk unit.
  - But really… ☺
- You will want a minimum of 512MB memory, MORE is better, in many cases WAY more!

The Server

- If your i6.1 is going onto a POWER6 machine you also *cannot* use:
  - Twinax console. Gone. C-ya. Sionara. Bye-bye. GET OVER IT.
  - IXS cards or IXA attached servers. (Use iSCSI instead)
  - Thin Console. (Lan console is MUCH better now!)
  - 5074, 5079 towers. (HSL-1 only and 10K RPM disks only.)
  - ANY RAID card without Redundant Cache!
  - 10 Mb, 100Mb Ethernet cards and ANY Token Ring cards.
    - A moment of silence please for the demise of TokenRing.
      - Ok that was enough.. ☺
  - Lots of old RAID cards like 2763, 2782, 4748, 4778

The Server

- If your i6.1 is going onto a POWER6 machine you also *cannot* use:
  - Lots of old tape like 9348, 3490, 3570, 3575, 3580-Hxx, 3581-Hxx
    - OK Pretty much anything connected to a FC #2749 ☹
  - Pretty much any QIC *or* VXA tape
  - ANY 10K RPM disk units.
- You will want your HMC to be on Version 7.3.3

Server Firmware

- With V5R4 command DSPFMWSTS will display current firmware.
- Assure that the firmware of your system meets or exceeds the requirement of the LIC level you received.

```
 Display Firmware Status

Service partition . . . . . :   Yes
Firmware update policy  . . . . . :   *OPSYS
Server IPL source . . . . . :   Temporary
Firmware product ID/release . . . . . :   5722999  V5R4M0
Server IPL required . . . . . :   No



          --Server firmware--  -Operating system--
          Fix        PTF       Fix        PTF       Update
Copy      pack       ID        pack       ID        Status
*ACTIVE   SF240_320  MH01001
*TEMP     SF240_320  MH01001   SF240_320  MH01001   None
*PERM     SF240_320  MH01001   SF240_320  MH01001   None
```

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Those Darn Vendors …

- It seems like this should be common sense but you must MUST *MUST* review your vendor applications before you go to i 6.1
- This is the most critical release for vendor apps since CISC to RISC.
- An example is at a customer recently we discovered one, yes just one, program from a vendor that was compiled on V4R4 with observability removed.
  - No problem right?
  - Sorry this was the main entry point for the entire application!!
- Clearly you and only you can know what vendors' software that you are running.

Vendors

- Vendor software fits into three 'classes'
  - 1) Mainline production applications
    - SAP, MAPICS, BPCS, JDA, CMS and the like.
  - 2) Front-line add on and support applications
    - RJS, MKS, Arcad, MIMIX, DataMirror and the like.
  - 3) Utility applications
    - DBU, TAA, Robot, etc.
- Where are your land mines buried?
  - GROUP 3!

Those Group Three Vendors

- Everyone knows their main-line apps and the front-line and support apps too. It's those darn utilities that will bite you.
- These things are sprinkled through your system.
- Many may be only used periodically so you MUST resolve any issues in the object conversion reports.

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Object Conversion

- The starting point for all knowledge about object conversion is APAR II14306
  - From the Support for System i Web site:
    - Select Technical Databases
    - Then select APARS
    - Search for APAR II14306
      - Or follow this link: http://www-912.ibm.com/n_dir/nas4apar.nsf/c79815e083182fec862564c00079d117/3af47a966c4df9458625730600 3c6868?OpenDocument&Highlight=2,II14306
- The APAR will point out PTFs you need to load to each of your systems or partitions during the planning phase of your upgrade.

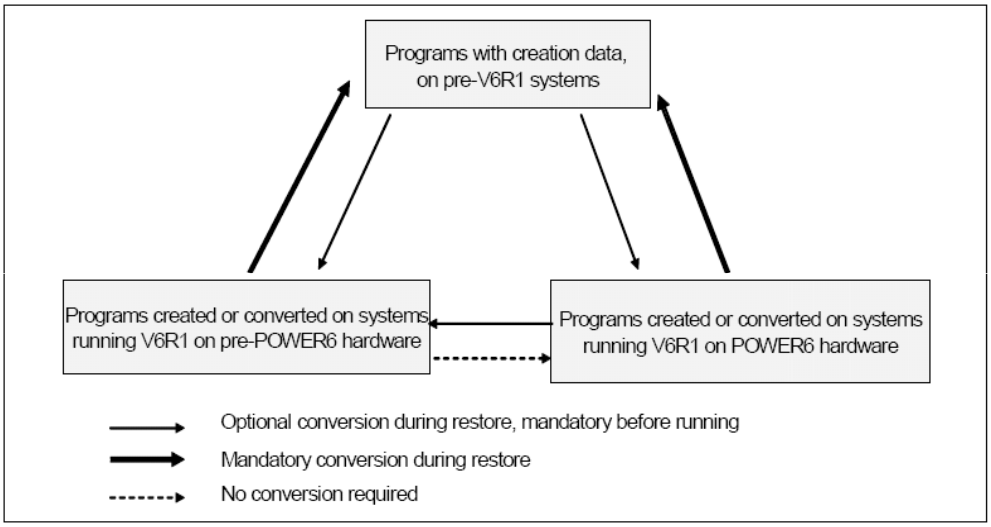
Prepare for Upgrade PTFs

- For V5R3 (and V5R3M5) the PTFs are:
  - SI32652, SI25504 and SI27473.
- For V5R4 (and V5R4M5) the PTFs are:
  - SI32649, SI25502 and SI26706.
- Once these PTFs are loaded the first step is to run ANZOBJCVN OPTION(*COLLECT) OBJ('/')
  - Suggested to run this thing in batch as it will do a pretty big bunch of I/O
- Once the data is collected then run ANZOBJCVN OPTION(*REPORT) REPORT(*LIBSUM)
  OPTION(*REPORT) REPORT(*OBJSUM)

Overall Process for Object Conversion

- Load the PTFs listed above
- Run the data collection
- Run the reports
- Fix problems the reports describes
  - Replace non-convertible programs
  - Delete unsupported options
  - Find missing source.
- Upgrade to V6R1
- Run the object conversion

Program Conversion Chart



- This shows the three-way list of possibilities.
  1) Pre V6R1 on Any processor. (Top)
  2) V6R1 on Pre POWER6 processors (Left)
  3) V6R1 on POWER6 processors (Right)

Conversion Summary

- So the bottom line is that the conversion MUST occur to and from V6R1 systems.
  - That is when objects from V5R4 are restored to a V6R1 system they need to be converted.
    - No surprise there.
  - However the flip side is that V6R1 objects restored to V5R4 ALSO get converted.
    - Potentially something not expected.
- OPTIONALLY conversion can even take place between V6R1 systems on POWER6 and previous processors.
  - So that means that V6R1 isn't V6R1?
    - Exactly!

V6R1 is Not V6R1? Say It Isn't So!

- It's so, so there!
- Consider the oldest machine that can run V5R4: FrankieIII.
  - He's a 270. He happens to have an SStar processor could have an IStar. He has 10K RPM disk units that could be as small as 8GB.
  - The kernel of i5/OS must load and run on that 8(?) year old IStar as well as the spanking new 5Ghz POWER6 machine you just bought, so must your programs!
  - This means the compiler in it's infinite handcuftedness (I made that up) must compile, on your super duper POWER6 for an IStar processor.
    - Bummer
  - You did know that the POWER6 processor is more than just MHz right?
  - It has many way cool and streamlined instructions built in.
  - With V5R4 you can't use 'em. You paid for them but…
    - Bummer (again)

…. Say It Isn't So! (Cont)

  - The good news is that the program I compile on FrankieIII can be restored to your brand new POWER6 and run straightaway unmodified.
  - The bottom line is that with this thinking the only release that could make *maximum* utilization of any given processor technology was the very LAST version to support that processor.
    - This occurs long after that processor is main line in most shops.
- V6 to the rescue!
  - With V6 we gain the ability to compile to the processor!
  - So now we can utilize the technology of the processor with only the Second release that supports it!
  - This is GOOD!
  - There is a price to be paid for this capability and that's where we started: Programs compiled on V6R1 on POWER6 and optimized for that processor MUST be converted when restored to pre-POWER6 processors.
    - The inverse is also true.

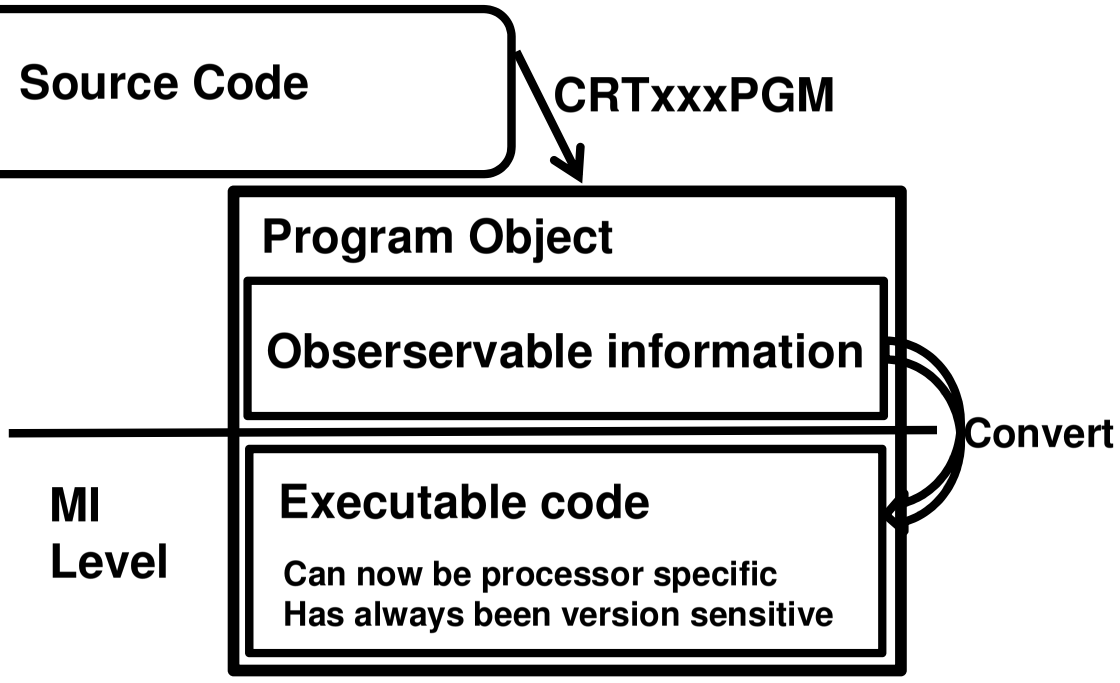
The Never Ending Conversion?

- So this sounds like a conspiracy to burn up CPU cycles?
  - (Which would be OK because I sell processing cycles!)
- Not really.
  - Consider how often you'll be moving between POWER6 and older processors.
    - If that's a LOT then you may want to compile to the lower levels.
    - If it's rare or never you will want to compile to POWER6 and maximize your investment in that technology.
      - Just be aware of the restore to different CPU penalty.
        - For example what CPU is at your DR facility?
  - Consider the power of today's processors.
  - Consider that this is also not a full compile only PRM.

But It's Not All About the Hardware.

- Over the years the System i has enjoyed a reputation for being extremely securable and reliable.
- Much of that is due to the object oriented architecture on which it is built.
- In some cases vendors and other coders have been able to create programs that access system resources they shouldn't have.
- Also while I know of no cases where this has happened I do know that IBM wants to prevent tweaking of the operational code portion of each program.
- So as part of the process IBM is requiring that all programs get rebuilt below the MI.
  - To understand this lets look at the parts of a program. (Next)

Program Components



Program Parts

- The program consists of two primary components
  - The parts above the MI where the resolved program instructions (observability) live
  - The parts below the MI which are machine level instructions.
    - Clearly these components must execute on the LIC that's in place.
    - These components also have access to things your program cannot access.
    - These parts MUST be protected.
- To assure integrity the part above the MI is regenerated into the program executable during the conversion.
  - The bonus is some better code, optimization, and other benefits are also realized.

Conversion Wrap-up

- Program conversion is an issue but handled properly is not a show stopper.
- DO your homework!
- Programs aren't the only thing that get converted but they are the primary components of it.

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Applications With Old Code.

- The old code problem is something that reared it's head in the CISC to RISC days and now it's back.
- Some of you out there are running things written 20 (or more!) years old.
  - Why do you DO that? (Because they work maybe?)
- By old code in this case we mean anything prior to V5R1
- The additional qualifier is that software older than V5R1 can still be OK if observable information 'observability' has not been removed.

Removed Observability

- As you process the programs that won't convert you may find a number of them compiled a long long time ago that just keep on running.
- Even if they are old though observability allows them to migrate.
  - Once removed observability can only be replaced by compiling from source.
- Note that some compilers don't exist any longer!!
  - FORTRAN, BASIC, PL/1
  - You may need an OLD machine to recompile!

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Missing Source

- Remember the discussion about encapsulation and all that?
- There are only two ways to get programs with observability in them:
  - 1) Get new ones from the vendor
  - 2) Compile from source
- When the software is your software then you've taken option #1 off the table.
- Prior to your upgrade you *MUST* assure that programs requiring a re-compile have valid source.
- Note that some compilers don't exist any longer!!
  - FORTRAN, BASIC, PL/1
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To PTF or Not to PTF…

- TO PTF is the answer!
- No matter what your source release is you will want to get current on PTFs before you upgrade.
- Step one is to identify the pre-upgrade PTF disk that comes with each upgrade.
  - Load that disk and run GO PTF option 8.
    - NO IPL is required for these PTFs.
- Step two is to load the appropriate recommended PTFs
  - V5R4M0
    - SI31017, MF42600, MF43154
  - V5R4M5
    - SI28697, MF42601, MF43157

PTF Completion

- Step three is to load the latest HIPER group for your current O/S.
  - Use GO PTF option 8 for this one as well.
- Step four is to apply all PTFs permanently.
  - APYPTF and prompt
    - Select *ALL for PTFs
    - Select *PERM for apply type.
    - PWRDWNSYS *IMMED RESTART(*YES)
  - After this IPL you should be IPLed on the “A” side as all PTFs are now permanent.
- This important step clears up the disk space occupied by the temp PTFs

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BIG Images.

- So you were amazed that IBM i 6.1 comes on 3 disks and the CUME is only one weren't you?
- Remember the list of supported hardware a few slides back?
- ALL of those servers had a minimum requirement of a DVD.
- This allows IBM to use DVD media as you are now on hardware that is required to have a DVD drive.
- Have you done ADDIMGCLGE for with the disks that came with i6.1?
  - Them there disks be DVDs so do the math.
    - CD = roughly 600 MB or so.
    - DVD = up to 4.7 GB or more than 7 times the size.
    - Also more than 7 times the time to load.

BIG images. (cont.)

- Other issues with these jumbo images:
  - Using FTP to move the images around your network is problematic.
    - Some firewalls will disconnect the control port even though the data port is happily passing data as fast as it's little chips will allow.
    - Increasing timeouts will solve this problem.
  - QFileSvr.400 chokes on files over 2GB. So ADDIMGCLGE where the FROMFILE is in this file system will fail for images over 2GB.
  - The good news of course is there are not far fewer images to handle. ☺
  - In addition the growth in total size is about what you'd expect for a new release so once you factor that in, there is no real issue here.

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Object Conversion Time (or Times)

- Remember that this object conversion step takes time for every object that needs to be converted.
- This time can be allocated as a lump immediately after the upgrade
  - Conversion is stated by the STROBJCVN command
  - You make the call to convert individual programs, whole libraries, or your entire system.
    - Recommend that each Library be done separately
    - Failure to do this could run the conversion job out of spooled file entries as one is created for each object.
    - This also multiprocesses better.

Object Conversion Time (or Times)

- Don't forget IFS objects in your conversion!
  - Java and such hides down in the IFS
  - On SAP systems for example we've seen the IFS conversion take just as long as the QSYS conversion.
- Consider your post backup timing!! (Why?)
  - If you convert Prior to backup your system isn't up until later, BUT if you have to restore your objects are already converted.
  - If you convert After the backup the tape contains un-converted objects.

Object Conversion (cont.)

- Objects can also be converted "on the fly" by simply waiting until the object is first touched. THEN you wait. ☺
  - This can really choke your system if you are CPU limited and dozens or hundreds of users light up the system all at the same time.
    - It's likely that your users will be hyper sensitive after the upgrade so avoiding this is likely a good idea!
  - For lesser used stuff, utilities, developer libraries and such this likely isn't a bad plan.
  - Again consider backups. For the first few after an upgrade you may find these objects are converted if you need to restore.

Object Date and Time Stamps and Sizes

- So program module "A" was created in 1999 and is 256543 bytes and it gets converted during the V6R1 upgrade.
  - What happens?
    - Date/Time stamps CHANGE to the conversion date.
    - Size likely changes as well though it might not.
- Remember Save/Restore movements between systems?
  - You may very well need to adjust auditing rules to account for this.
- System value QFRCCVNRST has values from 0 to 7
  - 0 means nothing converts to 7 where everything is forced to convert.
    - Set to taste!
    - '2' is high enough to cause the conversion for programs.

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FTP Behavior Changes

- With V6R1 the FTP client attempts by default to use the extended passive mode.
- If you've scripted FTP or use a vendor product that does this you MUST understand this change.
- FTP operates in three modes
  - Dynamic
    - The client opens a dynamic port number and tells the server to send or receive data on that port.
  - Passive
    - The Server opens the dynamic port and tells the client to connect there to send and receive data.
  - Extended Passive
    - Same as passive but the data exchanged between the server and client contains less information and is therefore more secure.

FTP Mode Change

- Because extended passive mode sends less data and the FTP client now expects this mode, connections to servers that do not support it will fail.
- Solution!
  - SENDEPASV
    - This toggles the extended passive mode off
      - 'SENDEPSV is off'
- You can do this prior to the upgrade as the command isn't understood before V6R1 and will be ignored.
  - DO TEST this so that your scripts don't see the SENDEPSV command fail and therefore fail the entire transfer.

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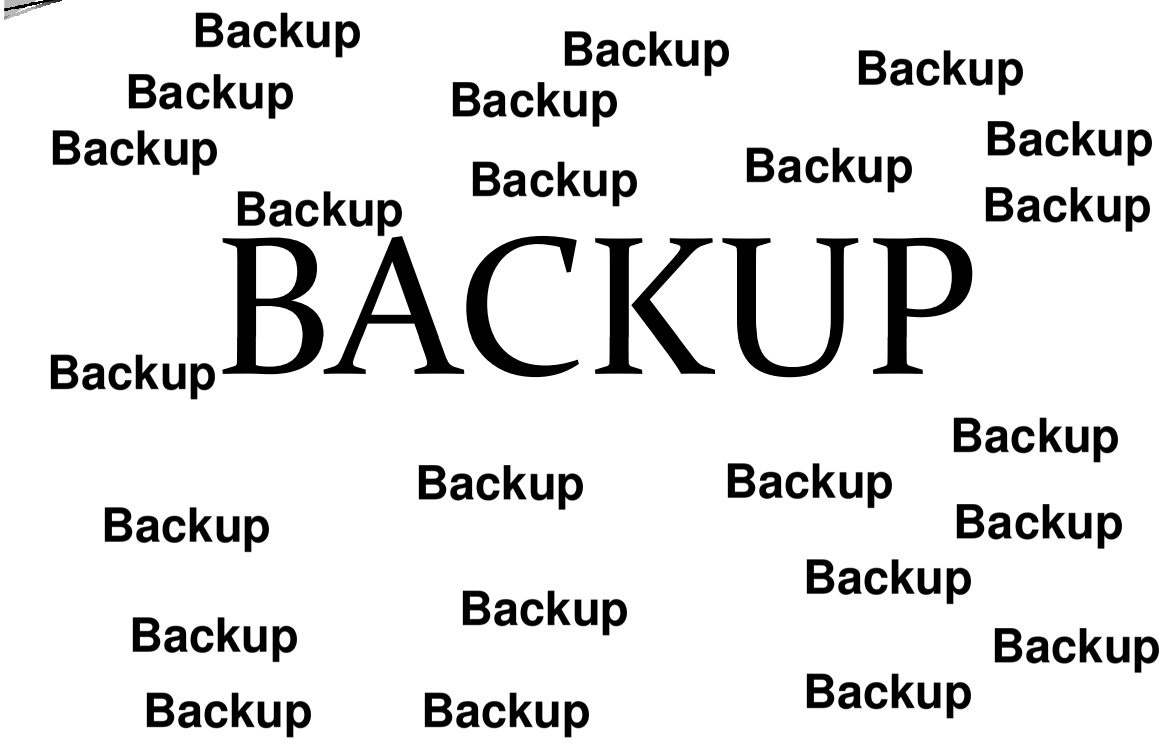


Backups?

- Didja get that?
- Yes it's our favorite topic as always, but it's IMPORTANT!
- You must backup before or you must complete form ID10T in triplicate.
  - File one copy with your boss
  - File one with the CEO
  - File the third with your spouse. (Because in a failure you may not see them for a long while…)
- Now AFTER you back up this is the one so many people tend to just skip.
  - Do I have to show the previous slide again?
- You WILL do a post upgrade backup. Period.
  - ABSOLUTELY POSITIVELY UNQUESTIONABLY a SAVSYS.
  - A SAVE 21 is preferred 100 to 1.

Backups

- Due to object conversion these backups must be planned as mentioned previously.
- You may even want to keep track of whether objects are already converted on these backups.
  - For one off object restores you do not care.
  - For full library restores you may very well care!
    - For example a large program library is saved pre-conversion.
    - System value FRCOBJCVN is set to require all objects that haven't been to be converted during the restore.
    - You restore the library for any reason, even making a copy for developers, testing etc.
    - You pay a restore penalty!

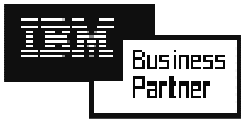
Key Points to Take Home

- Understanding the upgrade process will make you much more comfortable with this upgrade
- As with many things in the data center the more time you spend planning the less time you'll spend fixing!
- Pre-upgrade PTFs are very important for this release. Especially in the VMI area as well as for object conversion
- PLAN for object conversion. Do not be scared by it but be ready for it. This sill help you avoid time and performance penalties.

Resources

- System i Infocenter
  - www.ibm.com/systems/i/infocenter
- Fix Central
  - https://www14.software.ibm.com/webapp/set2/sas/f/hmc/home.html
- Entitled Software Services
  - www.ibm.com/eserver/ess/
- V6R1 Memo to Users
  - http://publib.boulder.ibm.com/infocenter/systems/topic/rzaq9/rzaq9.pdf
- i5/OS Program Conversion: Getting Ready for V6R1
  - www.redbooks.ibm.com/redpapers/pdfs/redp4293.pdf

QUESTIONS?

Contact me:

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