iInTheCloud

Frankeni
Technology Consulting, LLC

Controlling IBM i startup and shutdown

OCEAN Users Group

Larry "DrFranken" Bolhuis
Chief i-entist
Frankeni Technology Consulting, LLC
Middleville, MI.

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IBM Certified ™
Advanced
Technical
Expert

Why are we here?

- Back in the days of OS/400 the average system ran just a handful of subsystems.
  - A hundred jobs was a lot!
- Most workstations connected with Twinax
- There was no such thing as a web server or service because the only 'network' was Twinax attached PCs
- File sharing was minimal with only shared folders to store PC Files in.
- Even 'Email' (Office Vision) was green screen only!
- Communications was SNA, BUILT for crappy networks, with retry, reconnect and store and forward as core parts of the protocol.
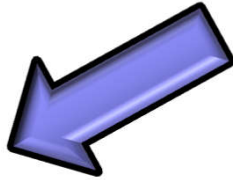
Why are we here?

- Today, this server could be running a dozen web servers, 20 subsystems, and thousands of jobs!

- And that's just in ONE Partition!!

- Networks can go 10Gbps with multiple connections.

- Startup sequence matters!

Agenda

- The BIG Picture
- Startup Thinking
- IPL Source and Type
- System values that affect startup
- IPL Attributes
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The BIG Picture

- This session is focused on your IBM i system or partition, BUT sometimes you have to start the entire datacenter, so lets give that a look.

- Cooling must be available or your startup will be short lived!

- Next start with power so your UPS needs to be active and on-line
  - NOT in Bypass!!
  - NOT with batteries nearly flat. Lay in a decent charge first.
  - Enable any controllable PDUs

- Next fire up any network and fiber switches

- Next light off your HMC and get logged into that
  - If you use LAN Console then fire that up here

- Next is any SAN Storage as well as tape drives, VTLs and any other surrounding infrastructure bits that have not been named.

Circling lower

- Finally it's time for the Power System
  - □ Begin by applying power and waiting for the green light to be blinking slowly.
- Once the server is in standby it can be powered up.
  - □ For HMC based servers best is to do this from the HMC.
  - □ If no HMC is utilized then the pressing of the white button is appropriate.
  - □ Also you can set this to happen automatically but not recommended for systems with multiple partitions.
- Once the Server has powered up to, partitions may be started.
  - □ 'Standby' on the HMC
  - □ Or no codes on the front panel and steady green on the control panel
- Consideration should be made for partition sequence
  - □ Start with VIO servers or any IBM i Partitions which host other partitions.
  - □ Also partitions which may host infrastructure pieces such as DNS.
- Finally it's time to start up IBM i
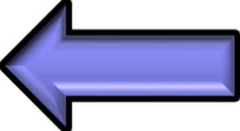
XPF/CPF default startup

- First thing is to read the selected copy of the LIC from the Load Source.
- The LIC assures that all disk units are indeed available.
  - Each disk unit contains a list of all other disks in the ASP.
  - Note that only the load source slot matters and even that requirement is significantly relaxed with SAS disks.
- Once that is fully loaded a console screen becomes available.
  - Initially the console is controlled by the LIC, later it transfers to IBM i in the 'check console' step.
- If the IPL is Manual it will stop after loading the LIC and present a menu.
  - This is useful for disk work or severe problem work for example.
- More than 40 steps are processed.
  - These include PTF processing, DB recovery, mirrored disk processing, spooled file processing, index recovery, and journal recovery, among others.
  - These are not steps we control, just ones that will happen.
  - The end result of this step is the Console sign on Screen

O/S Startup - Default

- For an IBM Default installation it will start the controlling subsystem (named in QCTLSBSD)
  - ☐ The IBM default startup program is QSYS/QSTRUP which will:
- Start a batch subsystem
- Release a few jobqs
- Start an interactive subsystem
- Start print writers
- Start QSYSWRK and QSERVER subsystems
- Once we take over control all things are possible!

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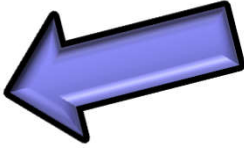
Startup Thinking

- When startup begins only IBM i is running.

    ☐ We need to know what else to start.

- First we need to understand the environment:

    ☐ Are we in restricted mode?

    ☐ Do we start printers?

    ☐ Do we start TCP/IP?

    ☐ Are we a backup or HA Partition?

    ☐ Was the IPL an Abnormal IPL?

    ☐ Should we behave differently based on system name or partition number?

Sequence Matters

- If we start communication jobs before TCP/IP is available that can be a problem.

- If we start jobs that require data in an iASP prior to varying it on, that would be a problem.

- If we start a job scheduler (AJS, Robot) before subsystems are started, that's an issue.

- These are but examples, there are a million of these.

- YOU make the call on your system which bits start in which order.

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IPL Source and Type

- The IPL Source is either A or B copy of the LIC or D.
  - ☐ A is only perm applied MF (LIC) PTFs
  - ☐ B adds all temp applied MF PTFs
    - This is the expected normal IPL for most systems
  - ☐ D is an IPL from media such as tape, optical or network.
    - Primarily used for upgrades, installs, and recoveries.
- The IPL Types today are Manual and Normal.
  - ☐ Normal proceeds through all the LIC IPL steps
    - IBM i is started based on the IPL Attributes
  - ☐ Manual stops at Dedicated Service Tools (DST).
    - IPLing beyond DST also prompts for other changes including PTF application and requires a IBM i Signon in the process.
    - Just before starting IBM i itself changes can be made to system values, network attributes, and the IPL can be allowed to complete normally or stop in restricted state.
      - ☐ Note: Restricted state is where only the console is available.

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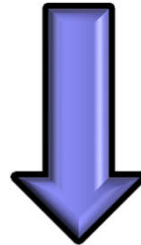
System Values

- **QABNORMSW – Previous end of system indicator**
  - Read Only
    - □ 0=Normal, 1=Abnormal.
    - □ Can be used to check for abnormal jobs, restart processes etc.

- **‡ QCTLSBSD – Controlling Subsystem Description**
  - □ This is the only subsystem started by IBM until the QSTRUPPGM is run.
  - □ The system console and the IBM Job scheduler run in this subsystem

- **QIPLSTS – IPL Status**
  - Read Only
    - □ 0=Operator Panel
    - □ 1=Auto IPL After power restored
    - □ 2=PWRDWNSYS RESTART(*YES) has occurred
    - □ 3=Time of day IPL – From the Power Schedule or QIPLDATTIM
    - □ 4=Remote IPL – A ringing phone line.
    - □ Note that 0 also is returned if IPL is started from the HMC

System Values

- QIPLTYPE – Type of IPL to perform
  - 0 = Unattended IPL
  - 1 = Attended IPL with dedicated service tools
  - 2 = Attended IPL, console in debug mode
  - A 1 works a lot like changing the IPL type to manual.
    - After PWRDWNSYS RESTART(*YES) the system will stop at DST.
    - When 'Perform an IPL' is selected all the same options are presented at the console.
    - The IPL type is NOT Set to Manual however and changing that does NOT affect this SysVal!
  - WARNING! Just like changing the IPL type at the HMC or front panel this change does NOT revert on it's own! Remember to correct it or your next IPL will be the same.

- QIPLDATTIM – Date and time to automatically IPL
  - Range is 5 minutes from now up to 11 months from now!
  - The IPL Type will be as set above.
  - A restart does NOT occur if the system is running at this time.
  - Useful for example if a scheduled outage is needed.
  - Additional rules for hosted partition!s!!

- QPFRADJ – Performance Adjustment
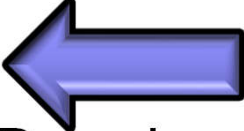 - 0=No, 1=At IPL only, 2=At IPL and Auto, 3=Auto only.

System Values

- **QPWRRSTIPL – Auto IPL after Power Restored**
  - Changed only via the HMC or ASMI unless the system is not partitioned.
    - ☐ Does what it says! ☺

- **QRMTIPL – Remote IPL**
  - Changed only via the HMC or ASMI unless the system is not partitioned.
    - ☐ Allow the system to IPL based on an inbound phone call.

- **QSCPFCONS – Action when an attended IPL has a console problem.**
    - ☐ 0=End the IPL
    - ☐ 1=Continue in unattended mode (Default)

- **QSRLNBR – The System Serial number**
  - Read Only
    - ☐ Useful when the same startup program is run on multiple physical systems such as a production and an HA or DR system.

- **QSTRPRTWTR – Start print writers at IPL**
  - Read Only
    - ☐ Influenced by CHGIPLA or IPL Options screen 'Start Print Writers' choice in attended IPLs

System Values

- QSTRUPPGM – System Startup Program
  - ☐ The key to proper system startup. Much more later!

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The IPL Attributes

- These are ways to control much of the behavior of the system at IPL.

- They are especially useful for simple systems but are valid for all.

- On the following screen the entire CHGIPLA command is shown as you would see it on your system.
  - We'll go through them in an odd order after.

- WARNING, or COOL! Some of these automatically reset themselves.
  - I'll note these. ☺

Change IPL Attributes.

```
Change IPL Attributes (CHGIPLA)

Restart type . . . . . . . . . . . *FULL        *SYS, *FULL
Keylock position . . . . . . . . . *NORMAL      *NORMAL, *AUTO...
Hardware diagnostics . . . . . . . *MIN         *MIN, *ALL
Compress job tables  . . . . . . . *NONE        *NONE, *NEXT...
Check job tables . . . . . . . . . *ABNORMAL    *ABNORMAL, *ALL, *SYNC
Rebuild product directory  . . . . *NONE        *NONE, *NORMAL...
Mail Server Framework recovery     *NONE        *NONE, *ABNORMAL
Display status . . . . . . . . . . *ALL         *SYS, *NONE...
Start TCP/IP . . . . . . . . . . . *YES         *YES, *NO
Spooled file recovery  . . . . . . *DETACH      *DETACH, *REMOVE
Clear job queues . . . . . . . . . *NO          *YES, *NO
Clear output queues  . . . . . . . *NO          *YES, *NO
Clear incomplete joblogs . . . . . *NO          *YES, *NO
Start print writers  . . . . . . . *YES         *YES, *NO, *NONE
Start to restricted state  . . . . *NO          *YES, *NO
```

Not so useful options.

- These are not so useful or not so impactful options!

```
Keylock position . . . . . . . .   *NORMAL      *NORMAL, *AUTO...
```
- Keylock effectively is worthless. No systems support an actual key any longer and the difference between the two remaining options *NORMAL and *AUTO are nill.

```
Display status . . . . . . . . .   *ALL         *SYS, *NONE...
```
- If you are watching the console setting this to *NONE will reduce what you see. Why would you want to do that? ☺

```
Hardware diagnostics . . . . .   *MIN         *MIN, *ALL
Restart type . . . . . . . . . .   *FULL        *SYS, *FULL
```
- These two either make no difference or are not allowed here. If you have an HMC they must be done from the HMC.

Work done at IPL time

- These three options normally are not required. The values here are appropriate for most situations.

```
Compress job tables  . . . . . .    *NONE        *NONE, *NEXT...
```

- Compress job tables removes unused entries from the job tables.
- If a large quantity of jobs have been deleted (ended from job queues or spooled files deleted) then *NEXT is a reasonable choice. (*NEXT reverts to *NONE after one IPL)
- If you are very close to QMAXJOB frequently you may want *NORMAL or *ALL
- This one may take significant time!! (You have been warned.)

```
Check job tables . . . . . . . .    *ABNORMAL    *ABNORMAL, *ALL, *SYNC
```

- Checking the tables is a good idea after an abnormal IPL. A good choice.

```
Rebuild product directory  . . .   *NONE        *NONE, *NORMAL...
```

- This will recreate the directory of installed products. This normally is required only after an install or an upgrade.

Cleanup options

```
Mail Server Framework recovery     *NONE          *NONE, *ABNORMAL
```

- Selecting *ABNORMAL here will cause recovery during an abnormal IPL. Normally this occurs only when MSF is started. (STRMSF)

```
Spooled file recovery  . . . . .  *DETACH     *DETACH, *REMOVE
```

- This directs the system to either action when jobs are found to be damaged.

```
Clear job queues . . . . . . . . .  *NO          *YES, *NO
Clear output queues  . . . . . .  *NO          *YES, *NO
Clear incomplete joblogs . . . .  *NO          *YES, *NO
```

- These cause the system to perform the selection options on the next IPL.
- Each of the three reset to *NO after one IPL.
- One should understand that at least that the first two should be used with caution!!!

Control options

- These are the three most used or perhaps most important options on CHGIPLA.
- These first two are great when doing system work for example a perm apply of all PTFs. You need to IPL but want to come up to a restricted state.

```
Start print writers  . . . . . R  *YES        *YES, *NO, *NONE
```

- This one has three values.
  - *YES is pretty clear, start them!
  - *NO also clear, but it works one time and then resets to *YES.
  - *NONE is effectively *NO Always. This option is NEW in i 7.3.

```
Start to restricted state  . . R  *NO         *YES, *NO
```

- Directs the system to come up with only the console.
  - *YES means console only and resets to *NO after one IPL.
  - *NO is normal and the controlling subsystem starts with that

```
Start TCP/IP . . . . . . . . . . .  *YES        *YES, *NO
```

- Directs the automatic starting of TCP/IP.

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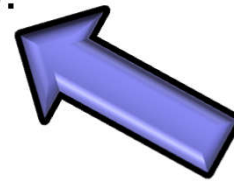
The starting of the TCP

- IBM Provides a basic startup process.
  - ☐ It starts basic TCP/IP
  - ☐ It starts IPV4 and IPV6
  - ☐ It starts interfaces marked as autostart *YES
  - ☐ It starts services marked to start.
  - ☐ It does so at its own pace, and its own sequence.
- So we know there are multiple TCP pieces.

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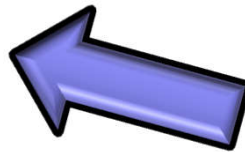
Identifying the system

- Often it makes sense to have one startup program used on multiple partitions.

- For that to work we need to know where we are executing.

- Key bits to utilize:
  - System serial number
  - System partition number
  - A Primary or Backup flag such as a data area.
  - Potentially react differently based on time of day or day of week.

- Follows is a program to retrieve partition name and number.

PGM

```
Dcl         &Return     *Char    4
Dcl         &Receiver   *Char  344
Dcl         &PartnID    *Int     4 Stg(*Defined) DefVar(&Receiver 41)
Dcl         &Format     *Int     4 Value(  1) /* Option to Receive */
Dcl         &Length     *Int     4 Value(344) /* Len of &Receiver  */

Dcl         &PartnName *Char 256    /* Partition Name.                */
Dcl         &Msg1       *Char    2  /* Holds Partition No. for display */
Dcl         &Msg2       *Char   30  /* Holds Partition Name for dsply  */

Dcl         &CvCCSID1   *Int     4  Value(1208) /* From CCSID */
Dcl         &Cvs1       *Char 256               /* Value to Convert  - Input  */
Dcl         &Cvl1       *Int     4  Value( 256) /* Length of value to convert */
Dcl         &Cvst1      *Int     4  Value(   1) /* 1=Null Terminated input    */
Dcl         &CvCCSID2   *Int     4  Value(  37) /* To   CCSID */
Dcl         &Cvs2       *Char 256               /* Converted Value - Returned */
Dcl         &Cvl2       *Int     4  Value( 256) /* Length of converted value  */
Dcl         &Cvst2      *Int     4  Value(   2) /* 2=Return Space Padded val   */
Dcl         &Cvgccasn   *Int     4  Value(   0) /* 0=Use Default Conversion    */
Dcl         &Cvl3       *Int     4  Value( 256) /* Byte Lngth of Cvted String */
Dcl         &Cvl4       *Int     4  /* Not Used, Not Supported */
Dcl         &Cvfb       *Char   12  /* Binary Feedback Area     */
```

```
CallPrc    PRC('dlpar_get_info') PARM((&Receiver) +
           (&Format *BYVAL) (&Length *BYVAL)) RTNVAL(&Return)


ChgVar     VAR(&MSG1) VALUE(&PartnID)


CHGVAR     VAR(&CVS1) VALUE(%SST(&Receiver 89 256))


Call       QtqCvrt PARM(&CVCCSID1 &CVST1 &CVS1 &CVL1 &CVCCSID2 +
                   &CVST2 &CVGCCASN &CVL2 &CVS2 &CVL3 &CVL4 &CVFB)

  CHGVAR       VAR(&PartnName) VALUE(&CVS2)
  CHGVAR       VAR(&MSG2) VALUE(&CVS2)


  SNDPGMMSG  MSG(&MSG1 *BCAT &MSG2)

/* Compile a module from this source, then type the following:        */
/* CRTPGM PGM(LIB/NAME) MODULE(LIB/MODULENAME) BNDSRVPGM(*LIBL/QPMLPMGT) */

ENDPGM
```

- This is of course a demo program!
- A real use it would return the value &PartnName or &PartnID
- Either could then be used as a decision point in a startup or shutdown program

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The Startup program

- IBM provides a default program QSYS/QSTRUP.
    - It will recognize only QCTL or QBASE as controlling subsystems.
    - Others may be used but things won't be started correctly with the IBM default problem.
    - It also behaves differently between QBASE and QCTL
      With QBASE:
        - It will not start QPGMR, QINTER, or QBATCH
        - Jobqs will be allocated to QBASE instead.
      With QCTL
        - It starts QPGMR, QINTER, and QBATCH
        - Only the console runs in QCTL

- Fortunately the source is easily retrieved from the QSTRUP program in QSYS.
    - From there we can be in control!

A Basic startup program w/ PowerHA

```
/* Comments are above here. OR ELSE!    */
QstrUp:  Pgm

    Dcl &StrWtrs  *Char   1     /* Start printers */
    Dcl &AbbyNorm *Char   1   /* Abnormal IPL */

    MonMsg   Cpf0000   /* We cannot stop  */

    Qsys/StrSbs   Qspl   /* Start Spooling Subsystem */
    Qsys/StrSbs   Qserver   /* Start the Server Subsystem */
    Qsys/StrSbs   QUsrWrk   /* User work subsystem */
    Qsys/StrTcp   StrSvr(*Yes) StrIfc(*Yes) StrPtpPrf(*Yes) StrIp6(*No)
    Qsys/DlyJob   60        /* Wait 60 for TCP To start before starting Cluster Support */
```

Startup program continued

```
/* Create Data Area used for communications  */

Qsys/CrtDtaAra Qgpl/PwrHaStr Type(*Lgl) +
          TEXT('Indicates PowerHA Startup in Progress')

/* Send the PowerHA Startup to run under high profile user    */
/* Ehen it is complete it deletes the data area as a signal.  */
SbmJob Cmd(Call Qgpl/QStrUpB) Jobq(QCtl) User(HAOPER)

DoWhile ('1' *eq '1')  /* Forever Do */
 DlyJob  5  /* Wait 5 */

 ChkObj Qgpl/PwrHaStr ObjType(*DtaAra)
 MonMsg (CPF9801) Exec(Leave)  /* It's gone, Move on. */

EndDo
```

Startup program continued

```
RtvSysVal  Qabnormsw  RtnVar(&AbbyNorm)

Select
 When      (&AbbyNorm *EQ '0') Then(Do)
   Qsys/StrSbs   Qinter
 EndDo
 Otherwise (Do)
   Qsys/StrSbs   NoSignOn
 EndDo
EndSelect

Qsys/StrSbs   Qbatch
Qsys/StrSbs   Qpgmr
Qsys/StrSbs   Qcmn
```

Startup program continued

```
Qsys/RtvSysVal QstrPrtWtr  RtnVar(&StrWtrs)
If (&StrWtrs = '1') Then(Do)
  Call Qsys/QwcsWtrs
EndDo

/* Start Advanced Job Scheduler now, Requires HAiASP to run. */
  SetAspGrp HAiASP
  StrJS   *Monitor  DtaLib(*All)

/* Final steps */

  Qsys/StrClnUp   /* Assure System Cleanup is running */

DaEnd: EndPgm
```

Startup program - High Auth Steps

/* Steps requiring more authority. Submitted to run under HAOPER */
/* HAOPER has needed authority but is *DISABLED and no password. */
QstrUpB: Pgm

```
    DclPrcOpt  Log(*Yes) UsrPrf(*Owner)
    MonMsg   Cpf0000            /* Again, do not stop! */

    Qsys/StrTcpSvr (*CIMOM *INETD)              /* Needed for PowerHA */

    Qsys/StrCluNod Cluster(HACluster) Node(Here)    /* Start local Cluster Node */

    Qsys/StrCluNod Cluster(MIBCluster) Node(There) /* Start remote Cluster Node */

    Qsys/StrCrg Cluster(HACluster)  CRG(HACrg)      /* Start the CRG */
```
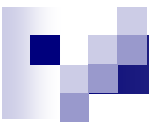
Startup program - High Auth Steps

```
Qsys/VryCfg HAiASP *Dev *On                    /* Bring the ASP on Line */

Qsys/ChgAspSsn Ssn(iASPSsn1)          +
    Option(*Resume)                   +
    AspCpy((iASPHERE iASPTHERE))   +
    AspDev(HAiASP)                         /* Resume Replication */

Qsys/StrCad Cluster(HACluster) AdmDmn(HAAdmin)  /* Start the Admin Domain */

Qsys/DltDtaAra Qgpl/PwrHaStr /* Delete the DA indicating we're done with this step. */

EndPgm
```

Running Shell script items

- Sometimes you need to initiate a process that runs in PASE.

- Remember that QP2SHELL is a batch version of Qp2TERM

- You can call QP2SHELL directly or submit it.

SBMJOB CMD(CALL PGM(QP2SHELL) Parm('/usr/local/mysql/bin/mysqld_safe' '-user=mysql &')) Job(MYSQLD) Jobq(QSYSNOMAX) User(QPGMR)

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Running higher security jobs

- The startup job runs as user profile QPGMR, and this can be a limitation.

- Optionally you could compile the program to be owned by a higher authority and adopt that authority.
  - ☐ Not all authorities can be adopted, however, so this too has limited success.

- The technique I have had success with is to create a secondary profile to run these bits with.
  - ☐ Two options I've used to handle this:
    - Option 1 is for the initial startup program do NOTHING but submit this second job under the higher authority user profile.
    - Option 2 is for the initial startup job to simply run as normal but then submit a second job for only the tasks that require more authority.
      - ☐ If this requires task synchronization then some coding is required.
      - ☐ I've used a data area created at submit and deleted by the secondary job when completed.
        - ▪ The primary job then monitors for the data area to go away and proceeds when its gone.
  - ☐ This profile has enough authority to run the needed tasks job.
    - Set to *DISABLED
    - No password
    - Then give QPGMR *USE authority to that profile so it can use it on SBMJOB.

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- Starting TCP/IP and applications.
- Identifying the system
- The startup program
- Running tasks that QPGMR may not do
- Considerations for HA/DR systems
- Shutting down the system
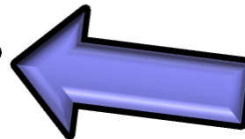
HA/DR Considerations

- More and more often today we have systems operating in pairs.
  - □ One is production, one is HA.

- These paired systems need to start up differently but be able to swap roles and then act like 'the other' system.
  - □ In this case it makes complete sense for the startup job to be the very same.

- What's different between the two systems?
  - □ Different IP addresses need to be started.
  - □ Different subsystems need to be started.
  - □ Depending on the job scheduler used it may need to be started or not.
  - □ Printers may not need to be started on the backup system.

- What's the same on the two systems?
  - □ The HA Software or environment needs to be running.

Agenda

- The BIG Picture
- Startup Thinking
- IPL Source and Type
- System values that affect startup
- IPL Attributes
- Starting TCP/IP and applications.
- Identifying the system
- The startup program
- Running tasks that QPGMR may not do
- Considerations for HA/DR systems
- Shutting down the system

System Shutdown – On purpose

- We don't shut IBM i down as often as we used to but it's still needed.

- In some cases it's not a complete shutdown
  - For example shut down far enough for a backup or key files reorganizations.

- The O/S itself pretty much doesn't care if you're very kind, rather kind, not so kind, or flatly rude. It will shut down and likely recover at IPL with little issue.
  - You may trigger abnormal IPL items
  - Your IPL may be longer if you are very rude!

- For your applications though you may wish to be kindler and gentler!
  - Only you can know the sequence of things to be brought down and whether those things can be clobbered (e.g. endsbs *immed) or if there is a program to call that will bring them down in an orderly manner.

Orderly Shutdown

- Sorts of things to cease and desist
  - ☐ User access to applications
  - ☐ Application background tasks
  - ☐ TCP Services
  - ☐ Print writers
  - ☐ Job queues
  - ☐ Subsystems
- Each of these things have ways to start them and to shut them down.
- Many of the application items already have defined programs to stop them. Often they are just hidden behind a menu item.
  - ☐ Find these and use them whenever possible.

Orderly…

- **You decide which items stop first. Suggestions:**
  - ☐ End any job schedulers (AJS, Robot, et. al.)
    - Stop new jobs from submitting
  - ☐ Hold Job queues
    - Prevent currently queued jobs from starting
  - ☐ End user subsystems, QINTER and friends.
    - Kick & Keep users off the system
  - ☐ End application support jobs
    - Various polling, queue reading, task handlers etc.
  - ☐ End print writers
    - Potentially at end of current print job.

Orderly…

- Suggestions, cont:
  - ☐ End communication subsystems
    - QSNADS
    - QCMN
    - QFAX
  - ☐ End various TCP Servers
    - SMTP, LPD, FTP, Telnet (Careful!), others
  - ☐ End Host Servers
  - ☐ End TCP
  - ☐ ENDSBS *ALL
    - If you want to be completely restricted
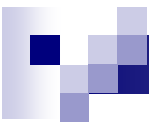
Make it happen

- Obviously the command we all know and love: PwrDwnSys
  - It has basically two options *IMMED and *CNTRLD
    - It should be clear that *IMMED means, 'el-quicko' ☺
      - This is the 'rather rude' option. Use with care and forethought!
    - *CNTRLD defaults to 1 hour of delay and then it flips to *IMMED.
- Various parameters there too:
  - CONFIRM - *YES or *NO to a confirmation screen
    - other options here as well
  - RESTART - *YES or *NO to re-IPL after the shutdown
  - ENDSBSOPT(*NOJOBLOG) will stop all running jobs from creating a joblog.
    - These are pretty pointless given WE are the cause. ☺
  - Additional options here that can be used to restart from alternate IPL or Image Catalogs for example.

System Shutdown – Oops!

- What about when bad things happen?
  - Power Outage
  - A/C Failure
  - Fire, Flood, Pestilence, size 14 failure etc.
- Some shutdowns are controlled by system values (next slide)
- Some are not so kind like over heating and EPO events.
- No matter what you are in much better shape if you have everything journaled!
  - When the system goes down 'thud' it's journaling that saves your bacon!
- The are also settings in the HMC that allow the system to shut down when the final partition is shut down.
  - Some may not like this setting but for others this is useful. YMMV!

System Values – Shutdown related

- **QUPSDLYTIM – UPS Delay time**
  - Requires UPS Cable and appropriate UPS connection.
  - One cable reports to ALL partitions on the frame.
    - ☐ Delay in seconds after the UPS reports 'On Battery' before the partition does PWRDWNSYS

- **QUPSMSGQ - UPS Message Queue**
  - ☐ UPS Messages are sent here (and QSYSOPR)
  - ☐ Intended to be used for user UPS processing programs.

- **QPWRDWNLMT – Power Down time limit for PwrDwnSys *Immed**
  - ☐ Cannot be less than QENDJOBLMT
  - ☐ When this timer hits normal end processing stops and the next IPL will be *ABNORMAL
  - ☐ Default is 900 seconds (15 min.) Reasonable.

- **QENDJOBLMT – Time limit for immediate ending of job.**
  - ☐ Effectively how long after SIGTERM is sent to job is allowed before the job is 'clobbered'
  - ☐ Default is 120 seconds (2 min)

Things to know and yell.

- If you IPL and see DST Screen but didn't want that. You can fix that with option 7 option 7 (operator panel functions)
  - Then select 2,2 B-side, Normal and whack F8.
  - Quicker than manually rolling through all the stops during an attended IPL.
  - Doesn't work for QIPLTYPE though, only Manual from control panel or HMC.
  - This DOES change the control panel or HMC setting as well.
- Any use of the ENDJOBABN command flags the next IPL as an abnormal IPL.
  - Not generally a huge deal but additional checks will be run.

Summary

- IBM i startup is not as simple as it once was!

- Options are many with lots of controls for us to use.

- Sequence matters, understand what jobs depend on what resources

- Know your system! Is this a production partition? HA Partition? Hosting partition? Start only what you need.

Controlling startup and shutdown of IBM i

Thank you!

Larry Amond	Larry Bolhuis
Greater Regional Alliance of REALTORS	Frankeni Technology Consulting, LLC.
larrya@grar.com	lbolhuis@frankeni.com
www.grar.com	www.frankeni.com