

IBM i



IBM i System Administration

Management & PASE

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IBM i sysadmin

kyndryl.

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30+ years of designing, building and managing mission-critical IT environments for our customers

Our IBM i people:

500

Skilled professionals

IBM i Skill badges earned
IBM i Certification
Third Party Certification

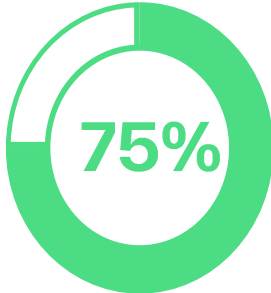
Powering mission-critical technology systems across essential industries

-  **5/5** top airlines by revenue passenger miles (RPM)
-  **45%** of passenger cars made by our customers
-  **61%** of assets under management by the top 50 banks managed by our customers
-  **4/5** largest retailers
-  **49%** of mobile connections managed by our customers

Empowering thousands of customers

4,000

Global customers, including:



...of the Fortune 100 and more than half of the Fortune 500

Providing undisputed IBM i leadership

-  **25M+** managed CPWs
-  **2500+** managed partitions
-  **12000+** changes realized per year
-  **300+** IBM i clients
-  **C4i IaaS** deployed in 7 countries
-  **12+ PB** IBM i storage managed
-  **1.2M+** backups realized per year

Agenda

- Introduction
- Browsing ACS/5250
- IFS (Integrated File System)
- System
- Daily checkup
- Jobs & Logs
- Networking
- Storage & Backup
- Useful parameters ACS/5250
- PASE & Unix-like



Introduction

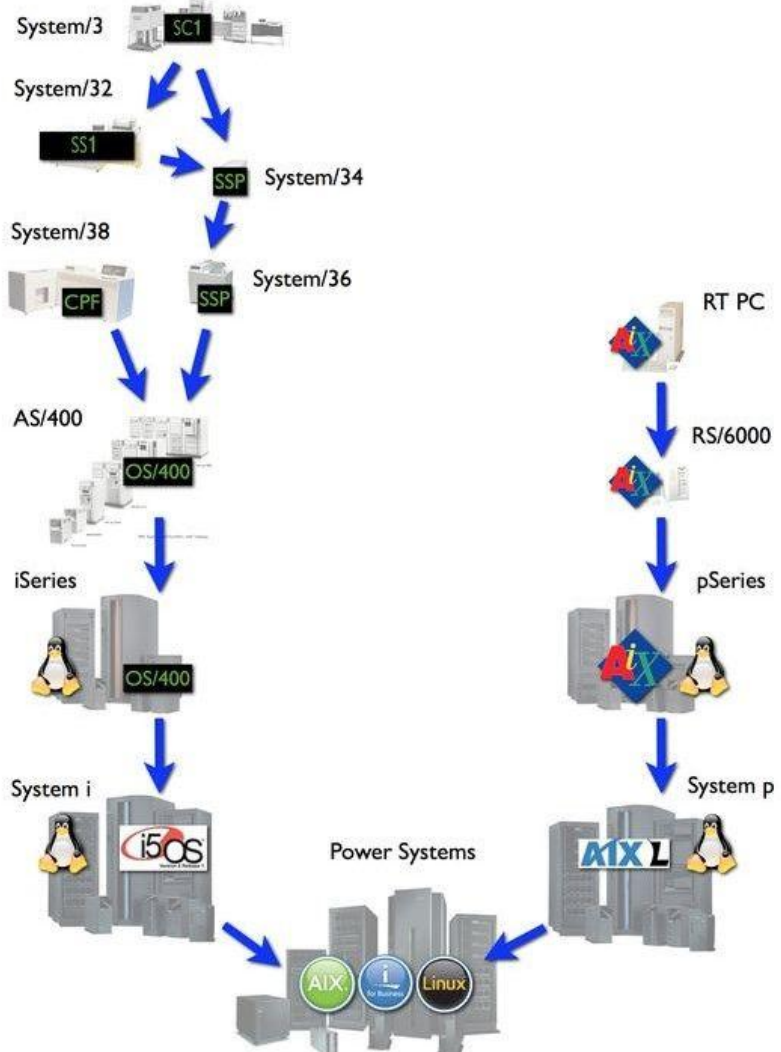
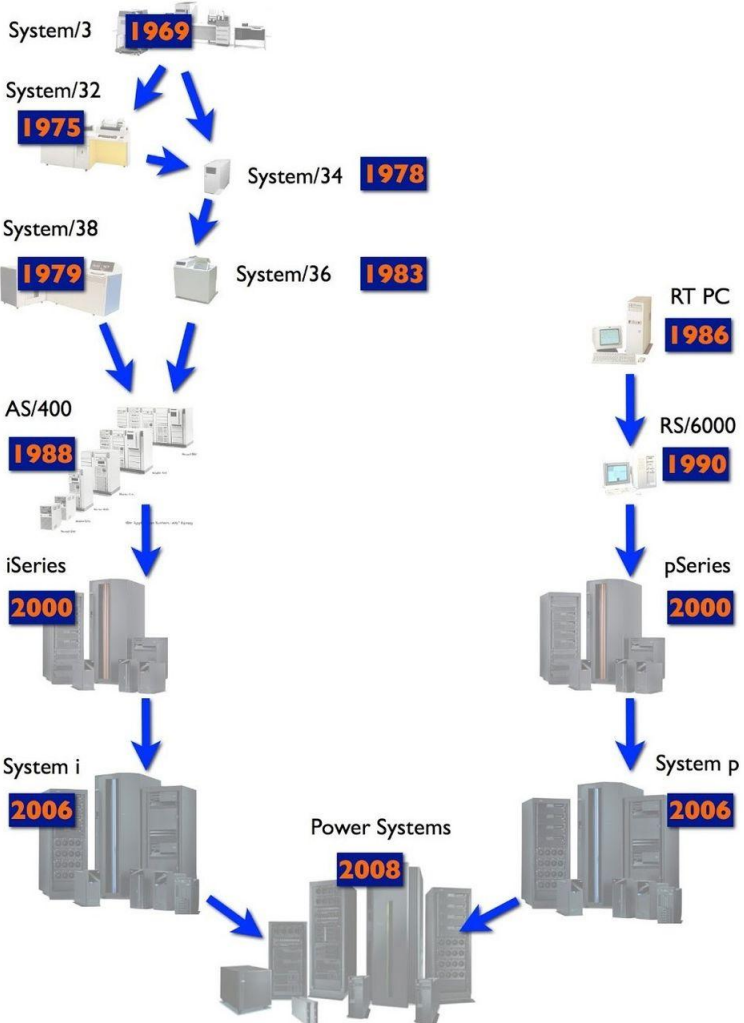
Roles of an IBM i sysadmin

- Manage user profiles and security
- Patch OS and PTFs
- Monitor jobs and system health
- Backup and recovery planning and execution
- Storage management
- Performance tuning
- Manage network
- Troubleshoot hardware and software issues

- ... and many other tasks (automation, documentation, scheduling, etc)

IBM Power Systems

Platform name	Operating system	Year
AS/400	OS/400	1988
iSeries	OS/400	2000
System i	i5/OS	2004
Power Systems	IBM i	2008



POWER 5 was the first processor to support i5/OS, AIX and Linux at the same time

Power processor

	V5R3	V5R4	V6R1	V7R1	V7R2	V7R3	V7R4	V7R5	V7R6	N+1
Power 5	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗
Power 6	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗
Power 7	✗	✗	✓	✓	✓	✓	✗	✗	✗	✗
Power 8	✗	✗	✗	✓	✓	✓	✓	✗	✗	✗
Power 9	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗
Power 10	✗	✗	✗	✗	✗	✓	✓	✓	✓	✗
Power 11	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓

Power 11



IBM Power S1122



IBM Power S1124



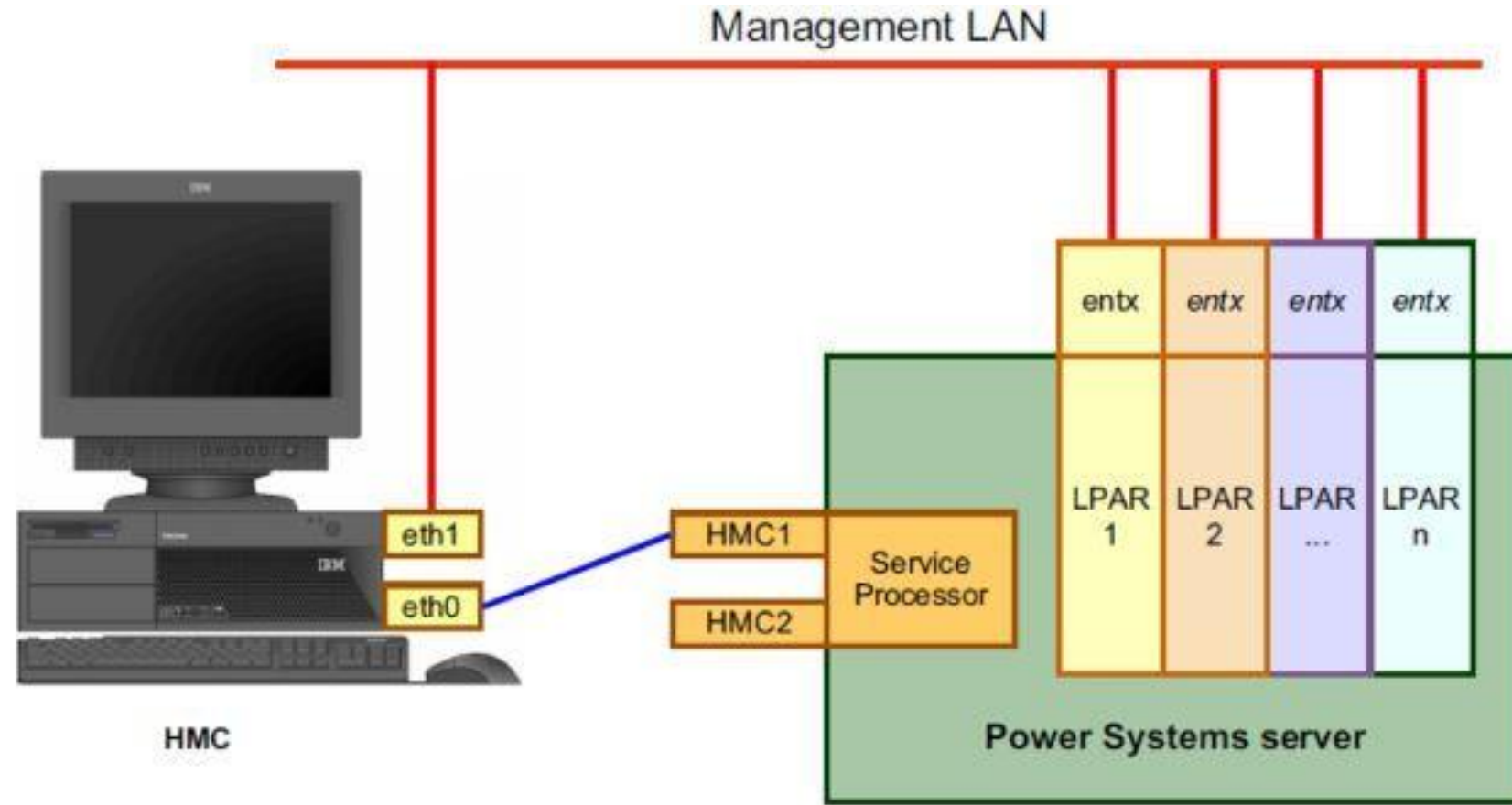
IBM Power E1150



IBM Power E1180



Architecture



i for...

What does "i" in IBM i means ?

Integration

DB2 for i & Single Level Store



Automate & optimize storage management

Object Based Architecture



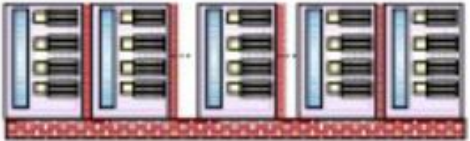
Enables integrity, security, virus-resistance

Integration



Integrates business components: DB, Web, Security

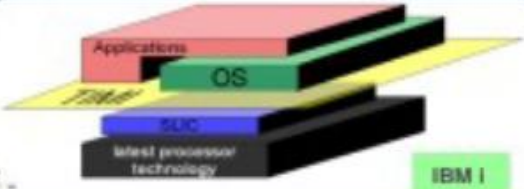
Work Management



Provides built-in application virtualization

Technology Independent Machine Interface

Ensures application compatibility across multiple technology generation.





Browsing ACS/5250

Main menu

⚠ Remember that F1 (Help) is your best and loyal friend when using IBM i 5250 session

```
MAIN                                IBM i Main Menu                                System:  FOTEST

Select one of the following:

  1. User tasks
  2. Office tasks
  3. General system tasks
  4. Files, libraries, and folders
  5. Programming
  6. Communications
  7. Define or change the system
  8. Problem handling
  9. Display a menu
 10. Information Assistant options
 11. IBM i Access tasks

 90. Sign off

Selection or command
===> _

F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F13=Information Assistant
F23=Set initial menu
(C) COPYRIGHT IBM CORP. 1980, 2018.                                FOTEST
```

Shortcuts

- **Ctrl + Tab**: move to next tab in ACS
- **Ctrl + Tab + Shift**: move to previous tab
- **Ctrl + W**: close current tab

- **Tab**: place at start of command line
- **End**: place at end of command line
- **F1 > F20**: enlarge help page
- **GO CMD<keyword>**: search a command
- **F14**: display command string (after putting parameters in command)
- **ESC + Shift + Enter**: system request

```
1. Display sign on for secondary job
2. End previous request
3. Display current job
4. Display messages
5. Send a message
6. Display system operator messages
7. Display work station user

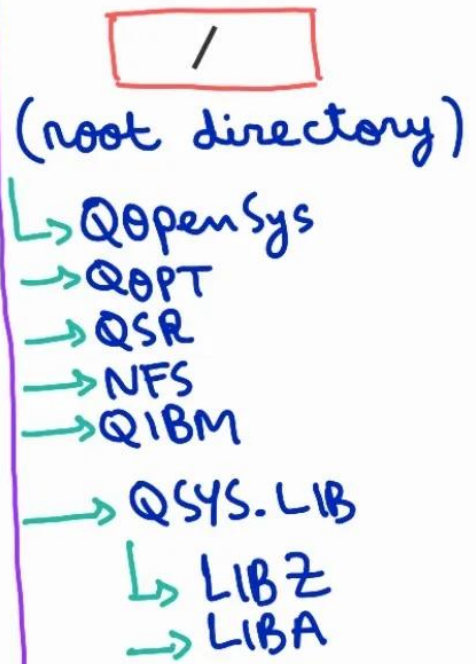
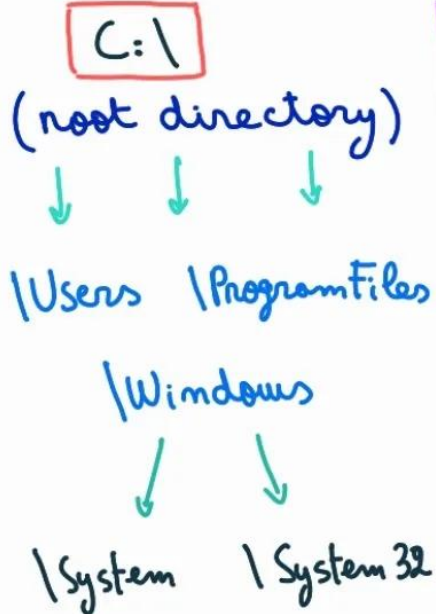
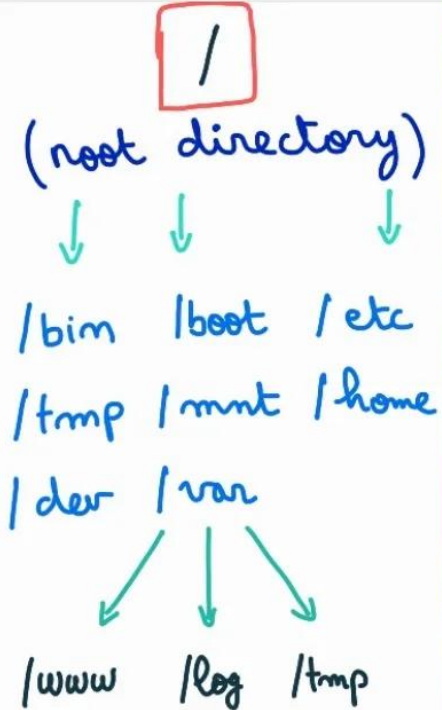
80. Disconnect job

90. Sign off
```




IFS

IFS (Integrated File System)



```

/QSYS (*LIB)
/QTEMP (*LIB)
/QGPL (*LIB)
/QPASE (*LIB)
/Zouhair (*USRPRF)
/LIBRARY (*LIB)
/QCLSRC (*PF)
/PGM (*CLP)
  
```

⊘ On IBM i, we can't have more than 2 levels of libraries

Why IBM choosed letter Q for system objects?

Letter	Share of English Words
A	11–12%
B	4–5%
C	8–9%
D	4–5%
E	2–3%
F	3–4%
G	3–4%
H	3–4%
I	5–6%
J	<1%
K	<1%
L	3–4%
M	4–5%
N	2–3%
O	3–4%
P	7–8%
Q	<0.5%
R	4–5%
S	11–13%
T	8–10%
U	1–2%
V	<1%
W	2–3%
X	<0.1%
Y	<1%
Z	<0.5%



Because it's the one of the least common letters for an English word



Libraries starting with "Q" are system objects, handle them carefully

IFS (Integrated File System)

File System	Name	Description
/	Root	The root directory is the first or top-most directory in a hierarchy. It can be likened to the root of a tree (the starting point where all branches originate)
QOpenSys	Open Systems	File systems such as UNIX, POSIX and XPG applications
QSYS.LIB	Library File System	Supports the main IBM i library structure in independent auxiliary storage pools (ASPs) we create and define
QDLS	Document Library Services File System	The QDLS file system supports the folders structure. It provides access to documents, DLO (Document Library Objects) and folders
QOPT	Optical File System	Data that is stored on optical media like CDROM or DVD
QNTC	NetClient File System	Access to data and objects that are stored on IXS (Integrated xSeries Server) running Windows NT 4.0 or later, or Linux operating system and some remote servers
QFileSvr.400	i5/OS Server File System	Provides transparent access to other file systems that reside on remote IBM i partitions
NFS	Network File System	Provides the user with access to data and objects that are stored on a remote NFS server
UDFS	User Defined File System	Resides on the auxiliary or independent ASP of our choice.



For security reasons, never share the entire IFS tree from the root

WRKLNK

Work with Object Links

Directory : /

Type options, press Enter.

2=Edit 3=Copy 4=Remove 5=Display 7=Rename 8=Display attributes
11=Change current directory ...

Opt	Object link	Type	Attribute	Text
—	ArcadIfsPrd	DIR		
—	ArcADSCM	DIR		
—	AutomaticRetrieval	DIR		
—	Domino	DIR		
—	FromCPAN	DIR		
—	Git	DIR		
—	Git.pm	STMF		
—	IBM	DIR		
—	IMRepository	DIR		

More...

EDTF

```
Directory: /
Position to : _____ Record : 1 of _____
New File : _____
2=Edit 4=Delete File 5=Display 6=Path Size 9=Recursive Delete
```

Opt	Name	Size	Owner	Changed	Used	CCSID or Symbolic Link
—	QOpenSys	*DIR	QSYS	19-05-26 10:08	07-06-26 12:07	
—	QDLS	*FLR	QDOC			
—	QSYS.LIB	*LIB	QSYS	07-06-26 14:10	07-06-26 14:10	
—	QOPT	*DDIR	QDFTOWN			
—	QFileSvr.400	*DDIR	QSYS	19-05-26 12:45	19-05-26 12:45	
—	QNTC	*DDIR	QDFTOWN	19-05-26 12:45	07-06-26 14:12	
—	dev	*DIR	QSYS	19-05-26 09:38	07-06-26 12:20	
—	home	*DIR	QSYS	05-05-26 14:14	07-06-26 12:20	
—	tmp	*DIR	QSYS	07-06-26 14:13	07-06-26 14:13	
—	etc	*DIR	QSYS	26-03-26 11:18	07-06-26 12:23	
—	usr	*DIR	QSYS	19-05-26 10:08	07-06-26 12:24	
—	QIBM	*DIR	QSYS	29-07-21 17:03	07-06-26 12:26	
—	QSR	*DIR	QSECOFR	27-05-26 11:49	07-06-26 12:26	
—	bin	*DIR	QSYS	19-05-26 10:09	07-06-26 12:23	/usr/bin
—	var	*DIR	QSYS	19-05-26 10:08	07-06-26 12:26	
—	lib64	*DIR	QSYS	22-02-16 16:14	07-06-26 12:04	/usr/lib64
—	www	*DIR	QIJS	09-09-25 12:35	07-06-26 12:26	

More...

- Be careful using recursive delete option)



System

CALL QLZARCAPI

3 > CALL QLZARCAPI

SYSTEM INFO -> SYSTEM SERIAL NUMBER: ██████████ . SYSTEM TYPE-MODEL: 9009-42G. PROCESSOR FEATURE CODE: EP5H. PROCESSOR GROUP: P20. MAX PHYSICAL PROCS IN SYSTEM: 22. CONFIGURABLE PROCS IN SYSTEM: 22.

PARTITION INFO -> NETWORK NAME: ██████████ . PARTITION NAME: ██████████ . PARTITION ID: 142. SHARING TYPE: SHARED. SHARING MODE: UNCAPPED. MIN PROCESSING CAPACITY: 0.05. DESIRED PROCESSING UNITS: 0.50. MAX PROCESSING CAPACITY: 1.00. ENTITLED PROCESSING CAPACITY: 0.50. MIN VIRTUAL PROCESSORS: 1. DESIRED VIRTUAL PROCESSORS: 1. MAX VIRTUAL PROCESSORS: 1. ONLINE VIRTUAL PROCESSORS: 1

PROCESSOR POOL INFO -> NUMBER OF VIRTUAL PROCESSOR POOLS CONFIGURED: 1. CURRENT PROCESSOR POOL ID: 0. MAXIMUM PROCESSING UNITS FOR PROCESSOR POOL 0: 22.

WRKSYSSTS (F21)

```
Display System Status                                F0TEST
                                                    07-06-26 13:30:48 CEST

Disk space:
System storage . . . . . : 2290G
System storage used . . . . . : 52.40%

Users:
Signed on . . . . . : 1
Temporarily signed off . . . . . : 0
Suspended by system request or group jobs . . . . . : 0
Signed off with printer output waiting to print . . . . . : 56

Batch jobs:
Waiting for messages . . . . . : 0
Running . . . . . : 120
Held while running . . . . . : 0
Ending . . . . . : 0
More...
```

```
Waiting to run/Scheduled . . . . . : 0
Held on job queue . . . . . : 0
Waiting on held job queue . . . . . : 0
Waiting on not assigned job queue . . . . . : 721
Ended with printer output waiting to print . . . . . : 54654
```

```
Select Assistance Level
Current assistance level . . : Advanced
Type choice below, then press Enter.
Assistance level . . . . . 1 1=Basic
                                   2=Intermediate
                                   3=Advanced
```

WRKSYSSTS

```

Select Assistance Level

Current assistance level . . : Intermediate

Type choice below, then press Enter.

Assistance level . . . . . 3  1=Basic
                               2=Intermediate
                               3=Advanced
    
```

Work with System Status				FOTEST			
				07-06-26 13:29:50 CEST			
% CPU used	:	1.6		System ASP	:	2290 G	
Elapsed time	:	00:00:01		% system ASP used	:	52.4016	
Jobs in system	:	55692		Total aux stg	:	2290 G	
% perm addresses	:	12.671		Current temporary used	:	9520 M	
% temp addresses	:	.009		Peak temporary used	:	9597 M	

Sys	Pool	Reserved	Max	-----DB-----		----Non-DB----	
Pool	Size M	Size M	Act	Faults	Pages	Faults	Pages
1	<u>3109.80</u>	1605.45	++++	.0	.0	.0	.0
2	<u>4116.13</u>	6.81	<u>134</u>	.0	.0	2.7	3.6
3	<u>811.87</u>	.00	<u>203</u>	.0	.0	.0	.0
4	<u>81.18</u>	.00	<u>5</u>	.0	.0	.0	.0

WRKSHRPOOL

Work with Shared Pools

System: FOTEST

Main storage size (M) . : 8119.00

Type changes (if allowed), press Enter.

Pool	Defined Size (M)	Max Active	Allocated Size (M)	Pool ID	-Paging Defined	Option-- Current
*MACHINE	3094.58	+++++	3094.58	1	*FIXED	*FIXED
*BASE	4131.35	134	4131.35	2	*FIXED	*FIXED
*INTERACT	811.87	203	811.87	3	*FIXED	*FIXED
*SPOOL	81.18	5	81.18	4	*FIXED	*FIXED
*SHRPOOL1	.00	0			*FIXED	
*SHRPOOL2	200.91	50			*FIXED	
*SHRPOOL3	.00	0			*FIXED	
*SHRPOOL4	.00	0			*FIXED	
*SHRPOOL5	.00	0			*FIXED	
*SHRPOOL6	.00	0			*FIXED	

SST

Start Service Tools (STRSST) Sign On

SYSTEM: FOTEST

Type choice, press Enter.

Service tools user ID. . . . _____
Service tools password . . .

System Service Tools (SST)

Select one of the following:

1. Start a service tool
2. Work with active service tools
3. Work with disk units
4. Work with diskette data recovery
5. Work with system partitions

7. Work with system security
8. Work with Service Tools Server Security and Devices

 To reset SST password `CHGDSTPWD PASSWORD(*DEFAULT)`



Daily checkup

DSPMSG QSYSOPR

```
Display Messages

System: FOTEST
Queue . . . . : QSYSOPR      Program . . . . : *DSPMSG
Library . . . . : QSYS       Library . . . . :
Severity . . . . : 99        Delivery . . . . : *HOLD

Type reply (if required), press Enter.
Informational only. A connection to a storage subsystem disk unit has
been restored.
Informational only. A connection to a storage subsystem disk unit has
been restored.
Informational only. A connection to a storage subsystem disk unit has
been restored.
Informational only. A connection to a storage subsystem disk unit has
been restored.
Informational only. A connection to a storage subsystem disk unit has
been restored.
Informational only. A connection to a storage subsystem disk unit has
been restored.
Journal receivers AUDRCV4826 and *N detached.

Bottom
```

DSPMSG QSYSMSG → display critical system messages (should have CRTMSGQ QSYS/QSYSMSG)

Work with Problems

System: FOTEST

Position to _____ Problem ID

Type options, press Enter.

2=Change 4=Delete 5=Display details 6=Print details
8=Work with problem 9=Work with alerts 12=Enter text

Opt	Problem ID	Status	Problem Description
___	2615839832	READY	*Attention* Hardware service may be required.
___	2614653575	ANSWERED	Fix request
___	2614134137	ANSWERED	Fix request
___	2614133992	PREPARED	Fix request
___	2614133984	READY	Fix request
___	2614133895	READY	Fix request
___	2614133492	PREPARED	Fix request



Jobs and logs

WRKACTJOB

Work with Active Jobs

FOTEST

07-06-26 13:25:23 CEST

CPU %: .0 Elapsed time: 00:00:00 Active jobs: 253

Type options, press Enter.

2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
8=Work with spooled files 13=Disconnect ...

Opt	Subsystem/Job	User	Type	CPU %	Function	Status
—	QPWFSERVS0	QSECOFR	BCI	.0		TIMW
—	QSERVER	QPGMR	ASJ	.0		EVTW
—	QZDASRVSD	QUSER	BCH	.0		SELW
—	QZLSFILET	QUSER	PJ	.0		TIMW
—	QZLSSERVER	QPGMR	BCH	.0		EVTW
—	QSPL	QSYS	SBS	.0		DEQW
—	IBMPRTSUP	QSPLJOB	WTR	.0		EVTW
—	PRTMEDIA	QSPLJOB	WTR	.0		EVTW
—	QSYSWRK	QSYS	SBS	.0		DEQW

More...

WRKACTJOB (F11 + F16)

CPU %: 2.9 Elapsed time: 00:01:06 Active jobs: 253

Type options, press Enter.

2=Change 3=Hold 4=End 5=Work with 6=Release 7=Display message
8=Work with spooled files 13=Disconnect ...

Opt	Subsystem/Job	User	Number	Type	CPU %	Threads	Temporary Storage
—	ZSDEPLMNG	QTMHHTTP	095027	BCI	1.2	6	38
—	ZSDAEMON	QTMHHTTP	095122	BCI	.8	6	26
—	ZENDPHP7	QTMHHTTP	095177	BCI	.2	1	20
—	ZSMONMNG	QTMHHTTP	095001	BCI	.0	6	40
—	ZSMONMNG	QTMHHTTP	094994	BCI	.0	1	10
—	ZSJAVA_BRG	QTMHHTTP	095034	BCI	.0	45	90
—	ZSJAVA_BRG	QTMHHTTP	095028	BCI	.0	1	11
—	ZSJAVA_BRG	QTMHHTTP	095021	BCI	.0	1	10
—	ZSDEPLMNG	QTMHHTTP	095023	BCI	.0	1	10

More...

F11 → more details

F16 → resequence

WRKACTJOB (F7)

Find a string

String

Column

*JOB

*SBS, *JOB, *CURUSR, *TYPE,
*FUNCTION, *STS, *POOL, *PTY,
*USER, *NUMBER

F8=Repeat find F12=Cancel F17=Top F18=Bottom

WRKJOBSCDE

Work with Job Schedule Entries

FOTEST

07-06-26 13:54:54 CEST

Type options, press Enter.

2=Change 3=Hold 4=Remove 5=Display details 6=Release
8=Work with last submission 10=Submit immediately

Opt	Job	Status	-----Schedule-----			Recovery	Next
			Date	Time	Frequency	Action	Submit
							Date
___	ARCADCLNUP	SCD	USER DEF	01:00:00	*WEEKLY	*SBMRLS	09-06-26
___	AXEXTIAS	SCD	*MON	06:50:00	*WEEKLY	*SBMRLS	08-06-26
___	AXFRTIAS	SCD	*MON	07:15:00	*WEEKLY	*SBMRLS	08-06-26
___	DIRSIZE1	HLD	USER DEF	00:01:01	*WEEKLY	*SBMRLS	08-06-26
___	DLYDIRDIFF	HLD	USER DEF	04:01:01	*WEEKLY	*SBMRLS	08-06-26
___	DLYLIBDIFF	HLD	USER DEF	05:01:01	*WEEKLY	*SBMRLS	08-06-26
___	KIIMHST	SCD	*ALL	07:00:00	*WEEKLY	*SBMRLS	08-06-26

More...

WRKJOBJS

QUSRIJS

Work with Jobs

FOTEST

7-06-26 13:51:37

Position to Starting characters

Type options, press Enter.

- 1=Add 2=Change 3=Hold 4=Remove 5=Display 6=Release/Reset
- 7=Submit immediately 8=Change command list 9=Change job LDA ...

Opt	Job Name	Group Name	Grp Seq	Status	Schedule Date	Schedule Time	Schedule
___	BACKUPPLAN	*NONE	0	*READY	8-06-26	9:00	*DAILY
___	BKU_IPL	*NONE	0	*READY	*NONE	0:00	*NONE
___	BKU_START	*NONE	0	*READY	*NONE	0:00	*NONE
___	BKUDAILY	*NONE	0	*HELD	*NONE	0:00	*SECOND
___	BKUWEEKLY	*NONE	0	*READY	*NONE	0:00	*NONE
___	BKUWEEKLY2	*NONE	0	*HELD	*NONE	0:00	*DAILY
___	CHECKMQ	*NONE	0	*HELD	*NONE	0:00	*MINUTES

More...

WRKJOBJS (option 19)

Position to Date _____

Type options, press Enter.

4=Remove 5=Display 7=Display job log 8=Work with job(WRKJOB)
9=Display JS log

Opt	Job Name	Group Name	Grp Seq	----- Date	----- Start	----- End	----- Elapsed	----- Completion
—	BACKUPPLAN	*NONE	0	29-05-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	30-05-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	31-05-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	1-06-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	2-06-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	3-06-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	4-06-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	5-06-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	6-06-26	9:00	9:00	0:01	*NORMAL
—	BACKUPPLAN	*NONE	0	7-06-26	9:00	9:00	0:01	*NORMAL

Bottom

WRKJOBJS (option 19 > option 7)

```
Display Spooled File
File . . . . . : QPJOBLOG
Control . . . . . : _____
Find . . . . . :
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8...+...9...+...0...+...1...+...2...+...3
5770SS1 V7R4M0 190621 Job Log FOTEST 07-06-26 09:00:02 CEST Page 1
Job name . . . . . : BACKUPPLAN User . . . . . : FR107312 Number . . . . . : 105133
Job description . . . . . : QDFTJOB Library . . . . . : QGPL
MSGID TYPE SEV DATE TIME FROM PGM LIBRARY INST TO PGM LIBRARY INST
CPF1124 Information 00 07-06-26 09:00:01.617944 QWTPIIPP QSYS 04CC *EXT *N
Message . . . . . : Job 105133/FR107312/BACKUPPLAN started on 07-06-26 at
09:00:01 in subsystem QBATCH in QSYS. Job entered system on 07-06-26 at
09:00:01.
CPI1125 Information 00 07-06-26 09:00:01.618817 QWTPCRJA QSYS 0110 *EXT *N
Message . . . . . : Job 105133/FR107312/BACKUPPLAN submitted.
Cause . . . . . : Job 105133/FR107312/BACKUPPLAN submitted to job queue
QBATCH in QGPL from job 094948/QIJS/QIJSSCD. Job 105133/FR107312/BACKUPPLAN
was started using the Submit Job (SBMJOB) command with the following job
attributes: JOBPTY(5) OUTPTY(5) PRTTXT() RTGDTA(QCMDB) SYSLIBL(QSYS
QSYS2 QUSRSYS) CURLIB(*CRTDFT) INLLIBL(QGPL QTEMP Q1WWT)
INLASPGRP(*NONE) LOG(4 00 *SECLVL) LOGCLPGM(*YES) LOGOUTPUT(*JOBEND)
OUTQ(/*DEV) PRTDEV(PRT01) INQMSGRPY(*DFT) HOLD(*NO) DATE(*SYSVAL)
SWS(00000000) MSGQ(/*NONE) CCSID(1147) SRTSEQ(*N/*HEX) LANGID(FRA)
CNTRYID(FR) JOBMSGQMX(64) JOBMSGQFL(*WRAP) ALWMLTTHD(*NO) SPLFACN(*KEEP)
More...
```

DSPJOBLOG

- Default parameters = your current job log
- F10: display detailed messages

```
Display All Messages

Job . . . : MRXA          User . . . : QSECOFR          System:  FOTEST
Number . . . : 109049

Job 109049/QSECOFR/MRXA started on 11-06-26 at 13:35:24 in subsystem QCTL
in QSYS. Job entered system on 11-06-26 at 13:35:24.
3 > go licpgm
3 > dspjoblog
> /*      */

More...
```

```
Display Job Log (DSPJOBLOG)

Type choices, press Enter.

Job name . . . . . * _____ Name, *
User . . . . . _____ Name
Number . . . . . _____ 000000-999999
Output . . . . . * _____ *, *PRINT, *APIDFN, *OUTFILE
```


WRKJOB

```
Work with Job (WRKJOB)

Type choices, press Enter.

Job name . . . . . * _____ Name, *
User . . . . . _____ Name
Number . . . . . _____ 000000-999999
Output . . . . . * _____ *, *PRINT
Option . . . . . *SELECT *SELECT, *STSA, *DFNA...
```

```
Work with Job

Job: MRXA User: QSECOFR Number: 109049 System: FOTEST

Select one of the following:

1. Display job status attributes
2. Display job definition attributes
3. Display job run attributes, if active
4. Work with spooled files

10. Display job log, if active, on job queue, or pending
11. Display call stack, if active
12. Work with locks, if active
13. Display library list, if active
14. Display open files, if active
15. Display file overrides, if active
16. Display commitment control status, if active

More...
```

DSPJOB

Display Job

Job: MRXA User: QSECOFR Number: 105551 System: FOTEST

Select one of the following:

1. Display job status attributes
2. Display job definition attributes
3. Display job run attributes, if active
4. Display spooled files

10. Display job log, if active, on job queue, or pending
11. Display call stack, if active
12. Display locks, if active
13. Display library list, if active
14. Display open files, if active
15. Display file overrides, if active
16. Display commitment control status, if active

More...

Selection

—

DSPLOG (system history log)

```

Display Log (DSPLOG)

Type choices, press Enter.

Log . . . . . QHST QHST
Time period for log output:
  Start time and date:
  Beginning time . . . . . *AVAIL Time, *AVAIL
  Beginning date . . . . . *CURRENT Date, *CURRENT, *BEGIN
  End time and date:
  Ending time . . . . . *AVAIL Time, *AVAIL
  Ending date . . . . . *CURRENT Date, *CURRENT, *END
Output . . . . . * *, *PRINT, *PRTWRAP...
  
```

⚠ Format of time & date (HHMMSS & MMDDYYYY)

```

Additional Parameters

Jobs to display . . . . . *NONE Name, generic*, *NONE, *ALL
  User . . . . . Name, generic*, *ALL
  Number . . . . . 000000-999999, *ALL
    + for more values
Message identifier . . . . . *ALL Name, *ALL
  + for more values
Message identifier selection . . *INCLUDE *INCLUDE, *OMIT
  
```

GO LICPGM > option 50

- History log about licenced programs and PTFs

Display History Log Contents

```
*PGM objects for licensed program 5733W90 option 02 may require installation.  
*PGM objects for licensed program 5770XE1 option *BASE may require installati  
*LNG objects for licensed program 5770XE1 option *BASE may require installati  
Some licensed programs not found on media.  
Licensed program installation failed.  
User installation processing started.  
User exit program QLPUSER did not run.  
User installation processing failed.  
Automatic installation not complete.  
Licensed program installation process started.  
*PGM objects for product 5770SS1 option 33 release V7R4M0 restored.  
*LNG objects for NLV 2924 for product 5770SS1 option 33 release V7R4M0 restor  
*PGM objects for product 5770SS1 option 3 release V7R4M0 restored.  
*LNG objects for NLV 2924 for product 5770SS1 option 3 release V7R4M0 restore  
Licensed program installation process completed successfully.  
Initialize System (INZSYS) started.  
Initialize System (INZSYS) processing completed successfully.
```

More...

Press Enter to continue.

WRKSPLF

Work with All Spooled Files

Type options, press Enter.

1=Send 2=Change 3=Hold 4>Delete 5=Display 6=Release 7=Messages
8=Attributes 9=Work with printing status

Opt	File	User	Device or Queue	User Data	Sts	Total Pages	Cur Page	Copy
—	QPRINT	QSECOFR	PRT01		RDY	1		1
—	QPCSMPT	QSECOFR	PRT01		RDY	1		1
—	QSYSPRT	QSECOFR	PRT01		RDY	1		1
—	QPCSMPT	QSECOFR	PRT01		RDY	1		1
—	QPRINT	QSECOFR	PRT01		RDY	1		1
—	QSYSPRT	QSECOFR	PRT01		RDY	4		1
—	QSYSPRT	QSECOFR	PRT01		RDY	1		1
—	QPRINT	QSECOFR	PRT01		RDY	1		1
—	QPRINT	QSECOFR	PRT01		RDY	1		1

More...



Storage & Backups

GO DISKTASKS

DISKTASKS

Disk Space Tasks

System: FOTEST

To select one of the following, type its number below and press Enter:

1. Collect disk space information
2. Print disk space information

10. Work with libraries
11. Work with folders
12. Work with objects by owner

PRTDSKINF

Better to launch it in BATCH mode

Type choices, press Enter.

```
Type of report . . . . . > *LIB          *LIB, *FLR, *OWN, *OBJ, *SYS
ASP device . . . . .      *SYSBAS     Name, *SYSBAS
Libraries . . . . .       *ALL          Name, generic*, *ALL
Objects . . . . .         *NONE         Name, generic*, *ALL, *NONE
Object types . . . . .    *ALL          *ALL, *ALRTBL, *AUTL...
                          + for more values
Smallest size . . . . .   0             Size in 1000 bytes
Sort by . . . . .        *SIZE         *SIZE, *OWNER, *LSTCHG...
```

```
5770SS1 V7R4M0 190621                               F0TEST    07-06-26 14:00:38 CEST      Page 1
                                     Disk Space Report
                                     System Information
Information collection start . . . . . : 07-06-26 12:00:02  Customize options specified for this report:
Information collection end . . . . .   : 07-06-26 12:03:26  Report type . . . . . : *LIB
Total disk space on system in 1,000,000  Asp device . . . . . : *SYSBAS
  bytes . . . . . : 2290649  Libraries . . . . . : *ALL
Main storage size in megabytes . . . . . : 8116  Size of smallest library . . . . . : 0
Machine type-model . . . . . : 9009-42G  Sort by . . . . . : *SIZE
System serial number . . . . . : 21-EFEDV
                                     % of          Size in
Description          Disk      1,000,000 bytes
User libraries       35.95      823389.11
User directories    13.00      297874.62
Folders and documents .01        298.42
QSYS                 .19        4267.65
Other IBM libraries  2.07      47416.25
Licensed Internal Code .43       9815.76
More...
```

Open source

Do you use another tool to view disk usage ?

ncdu (NCurses Disk Usage)

- `ncdu --color dark <directory>` → disk usage analyzer

```
ncdu 1.16 ~ Use the arrow keys to navigate, press ? for help
--- /QOpenSys
6.7 GiB [#####] /pkgs
6.5 GiB [#####] /QIBM
5.4 GiB [#####] /chroots
2.0 GiB [#####] /var
1.2 GiB [###] /root_path
137.6 MiB [ ] /opt
111.0 MiB [ ] /download
32.3 MiB [ ] /usr
1.6 MiB [ ] /etc
520.0 KiB [ ] /EIF
e 12.0 KiB [ ] /QSR
12.0 KiB [ ] /sbin
e 8.0 KiB [ ] /tmp
@ 4.0 KiB [ ] lib64
@ 4.0 KiB [ ] lib
@ 4.0 KiB [ ] bin
@ 4.0 KiB [ ] QOpenSys

Total disk usage: 22.0 GiB Apparent size: 19.5 GiB Items: 176634
```

```
ncdu help 1:Keys 2:Format 3>About

up, k Move cursor up
down, j Move cursor down
right/enter Open selected directory
left, <, h Open parent directory
n Sort by name (ascending/descending)
s Sort by size (ascending/descending)
C Sort by items (ascending/descending)
M Sort by mtime (-e flag)
d Delete selected file or directory
t Toggle dirs before files when sorting
-- more --
Press q to close
```

- `ncdu --color dark -r -o <scan.ncdu> <directory>` → Export scanned directory to file (read only)
 - `ncdu -f <scan.ncdu>` → read result

GO BRMS / DSPLOGBRM

```
BRMS                               Backup Recovery and Media Services for IBM i
                                     System:  F0TEST

Select one of the following:

  1. Media management
  2. Backup
  3. Archive
  4. Recovery
  5. Migration

 10. Scheduling
 11. Policy administration
 12. Reports

 20. Start console monitor
```

```
                                Display BRM Log Information                                F0TEST

Current date/time . . . . . : 10-06-26 10:03:26
Position to date . . . . . : 10-06-26

Date sent Time sent Message
10-06-26 8:00:02 BRM maintenance procedure started.
10-06-26 8:00:12 Version control checked volume usage.
10-06-26 8:00:14 Volume expiration procedure expired 0 volumes to give 229
10-06-26 8:00:14 Devices with density *ULTRIUM3 are not available.
10-06-26 8:00:14 Devices with density *ULTRIUM3 are not available.
10-06-26 8:00:14 Starting history content maintenance.
10-06-26 8:00:17 Media information maintenance removed 0 entries.
10-06-26 8:00:17 Migration information maintenance removed 0 entries.
10-06-26 8:00:18 243 entries were removed from the BRM log.
10-06-26 8:00:18 Media information report is created.
10-06-26 8:00:18 Library AAAATEST is not included in save strategy.
10-06-26 8:00:18 Library AFSSTARTER is not included in save strategy.
More...
```



Networking

Gather information

- `PING RMTSYS('x.x.x.x') > DSPJOBLOG` → test ping (ICMP)

```
PING RMTSYS('8.8.8.8')
Verifying connection to host system 8.8.8.8.
PING reply 1 from 8.8.8.8 took 5 ms. 256 bytes. TTL 119.
PING reply 2 from 8.8.8.8 took 5 ms. 256 bytes. TTL 119.
PING reply 3 from 8.8.8.8 took 5 ms. 256 bytes. TTL 119.
PING reply 4 from 8.8.8.8 took 5 ms. 256 bytes. TTL 119.
PING reply 5 from 8.8.8.8 took 5 ms. 256 bytes. TTL 119.
Round-trip (in milliseconds) min/avg/max = 5/5/5.
Connection verification statistics: 5 of 5 successful (100 %).
```

- `TRACEROUTE RMTSYS('x.x.x.x')` → trace route

```
TRACEROUTE RMTSYS('8.8.8.8')
Probing possible routes to 8.8.8.8 using *ANY interface.
1 [REDACTED] 4.254) 0.488 0.410 0.361
2 [REDACTED] 1.73) 1.55 1.50 1.44
3 [REDACTED] 5.145) 5.01 5.00 5.03
4 [REDACTED] .1.3) 4.99 5.01 5.02
5 ipv4.de-cix.fra.de.as15169.googl (80.81.192.108) 5.38 5.32 *
6 192.178.109.239 5.49 5.41 5.43
7 142.250.46.245 6.32 6.16 6.07
8 dns.google (8.8.8.8) 5.34 5.35 5.33
```

SNDSRVRQS

CHGCNTINF → Make sure that contact information is updated

Send Service Request (SNDSRVRQS)

Type choices, press Enter.

Action	<u>*TEST</u>	*PREPARED, *OPENED, *TEST...
Remote control point	<u>*IBMSRV</u>	Name, *IBMSRV, *CIM, *SELECT
Remote network identifier	<u>*NETATR</u>	Name, *NETATR

Additional Message Information

Message ID	CPZ8C02	Severity	00
Message type	Completion		
Date sent	07-06-26	Time sent	13:46:19

Message : Test request complete.
Cause : The test of the communications connections between this system and the remote service system was successful.

Ports scanning

How do you scan your ports on IBM i ?

Scanning ports (with NETSTAT)

- NETSTAT OPTION(*CNN) > F14

```
Remote      Remote  Local
Address     Port    Port    Idle Time  State
*           *       21      ++++++++  Listen
*           *       22      094:12:10  Listen
*           *       23      000:54:29  Listen
*           *       25      ++++++++  Listen
*           *       69      ++++++++  *UDP
*           *       123     000:30:20  *UDP
*           *       161     ++++++++  *UDP
*           *       389     000:04:47  Listen
*           *       427     ++++++++  *UDP
*           *       427     ++++++++  *UDP
*           *       446     004:44:52  Listen
*           *       447     ++++++++  Listen
```

Scanning ports (with service-commander & nmap)

Scan open ports on IBM i (from IBM i PASE), with "service-commander" package

```
scopenports
```

```
Address      Port      'sc' service name (and friendly name)
-----
0.0.0.0      22        system_sshd (System Secure Shell server)
::           22        system_sshd (System Secure Shell server)
0.0.0.0      23        system_telnet (System Telnet server)
::           23        system_telnet (System Telnet server)
0.0.0.0      80        port:80
0.0.0.0      446       system_ddm (System DDM server)
::           446       system_ddm (System DDM server)
0.0.0.0      447       system_ddm (System DDM server)
::           447       system_ddm (System DDM server)
0.0.0.0      448       system_ddm (System DDM server)
::           448       system_ddm (System DDM server)
0.0.0.0      449       system_as-svrmap (System *SVRMAP Host Server)
::           449       system_as-svrmap (System *SVRMAP Host Server)
0.0.0.0      657       system_rmc (Resource Monitoring and Control [RMC])
0.0.0.0      2001      system_http_admin (HTTP Admin Server)
0.0.0.0      2002      system_admin1 (Navigator for i (latest generation))
0.0.0.0      2004      system_admin2 (IBM Navigator for i)
0.0.0.0      2006      system_admin3 (management (Digital Certificate Manager, Db2 Mirror))
0.0.0.0      2008      system_admin4 (HTTP Administration for i)
0.0.0.0      2011      system_admin5 (HTTP Administration UI)
```

Scan the 100 most common open ports on IBM i (from Linux)

```
nmap -F x.x.x.x
```

```
Host is up (0.039s latency).
Not shown: 56 filtered tcp ports (no-response), 40 closed tcp ports (reset)
PORT      STATE SERVICE
22/tcp    open  ssh
23/tcp    open  telnet
80/tcp    open  http
2001/tcp  open  dc
```

Scan all open ports on IBM i (1 through 65535)

```
nmap -p- x.x.x.x
```

```
Not shown: 61011 closed tcp ports (reset), 4495 filtered tcp ports (no-response)
PORT      STATE SERVICE
22/tcp    open  ssh
23/tcp    open  telnet
80/tcp    open  http
446/tcp   open  ddm-rdb
447/tcp   open  ddm-dfm
448/tcp   open  ddm-ssl
449/tcp   open  as-servermap
2001/tcp  open  dc
2002/tcp  open  globe
2004/tcp  open  mailbox
2006/tcp  open  invokator
2008/tcp  open  conf
2011/tcp  open  raid-cc
2020/tcp  open  xinupageserver
4026/tcp  open  as-debug
4205/tcp  open  vrml-multi-use
8085/tcp  open  unknown
8210/tcp  open  unknown
8250/tcp  open  unknown
8470/tcp  open  cisco-avp
8471/tcp  open  pim-port
8472/tcp  open  otv
8473/tcp  open  vp2p
8474/tcp  open  noteshare
8475/tcp  open  unknown
8476/tcp  open  unknown
8477/tcp  open  unknown
8478/tcp  open  unknown
8479/tcp  open  unknown
```

MGTOOLS

MG Must Gather Data Collector
(C) COPYRIGHT IBM CORP. 2009, 2012

Select one of the following:

- | | |
|---------------------------------------|----------------------------------|
| 1. System Snapshot | 14. |
| 2. HA (High Availability) | 15. Work Management |
| 3. Performance/Misc collection | 16. Internals |
| 4. Client/Server | 17. Electronic Services |
| 5. Communications menu | 18. Integrated File System (IFS) |
| 6. Database menu | 19. Hardware data collection |
| 7. EBIZ (JAVA/HTTP/DCM/WAS/SMTP/LDAP) | 20. HMC menu |
| 8. Save/Restore menu | 21. DB2 Mirror Menu |
| 9. Misc tools | 22. QSPTLIB menu |
| 10. Data Upload Menu | 23. |
| 11. | 24. PTF menu |
| 12. QMGTOOLS Update Menu | 25. |
| 13. | 26. QMGTOOLS Help |



Useful parameters on ACS

ACS (useful parameters)

- Mute (sound off): edit → preferences → appearance → display → sound → alarm (off)
- Screen size: communication → configure → screen size (27×132)
- Blinking cursor: edit → preferences → appearance → display → allow blinking cursor (yes)
- Mouse wheel: edit → preferences → mouse wheel (enable)
- Button (quick access): edit → preferences → toolbar → add button



Integrated File System



From IBM i



To IBM i



Printer Output



Run SQL Scripts



SSH Terminal



Navigator for i...



Search Text



Scratch Pad

Watermark (example 1)

```
MAIN                                IBM i Main Menu
                                     System: ██████████
Select one of the following:

1. User tasks
2. Office tasks
3. General system tasks
4. Files, libraries, and folders
5. Programming
6. Communications
7. Define or change the system
8. Problem handling
9. Display a menu
10. Information Assistant options
11. IBM i Access tasks

90. Sign off

Selection or command
===>

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel  F13=Information Assistant
F23=Set initial menu
(C) COPYRIGHT IBM CORP. 1980, 2021.

MA █ C                               MW                                     20/007
```

Show Watermark Yes No

Watermark type Text Image

Display text

Display text color

Font


Image location

Position

Vertical padding

Horizontal padding

Opacity



Watermark (example 2)

```
MAIN                                IBM i Main Menu                                System: ██████████

Select one of the following:

  1. User tasks
  2. Office tasks
  3. General system tasks
  4. Files, libraries, and folders
  5. Programming
  6. Communications
  7. Define or change the system
  8. Problem handling
  9. Display a menu
 10. Information Assistant options
 11. IBM i Access tasks

 90. Sign off

Selection or command
===> _

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel  F13=Information Assistant
F23=Set initial menu

MA █ C                                MW                                IBM i                                20/007
```

The image shows a configuration dialog for the watermark feature. The settings are as follows:

- Show Watermark: Yes No
- Watermark type: Text Image
- Display text: IBM i
- Display text color: Yellow
- Font: Times New Roman
- Image location: (empty field with a "Browse..." button)
- Position: Custom Position
- Vertical padding: 0
- Horizontal padding: 0
- Opacity: 100%

A "Custom Position" sub-dialog is open, showing the following settings:

- Horizontal: 90
- Vertical: 90
- Width: 10
- Height: 10

Buttons for "OK", "Cancel", and "Help" are visible at the bottom of the sub-dialog.

Keywords for watermark

- **&COMPN**: computer name (Windows/Linux client)
- **&HOST**: IP address
- **&ID**: session ID
- **&NAME**: partition name
- **&USERN**: username that started the JVM (not IBM i user)

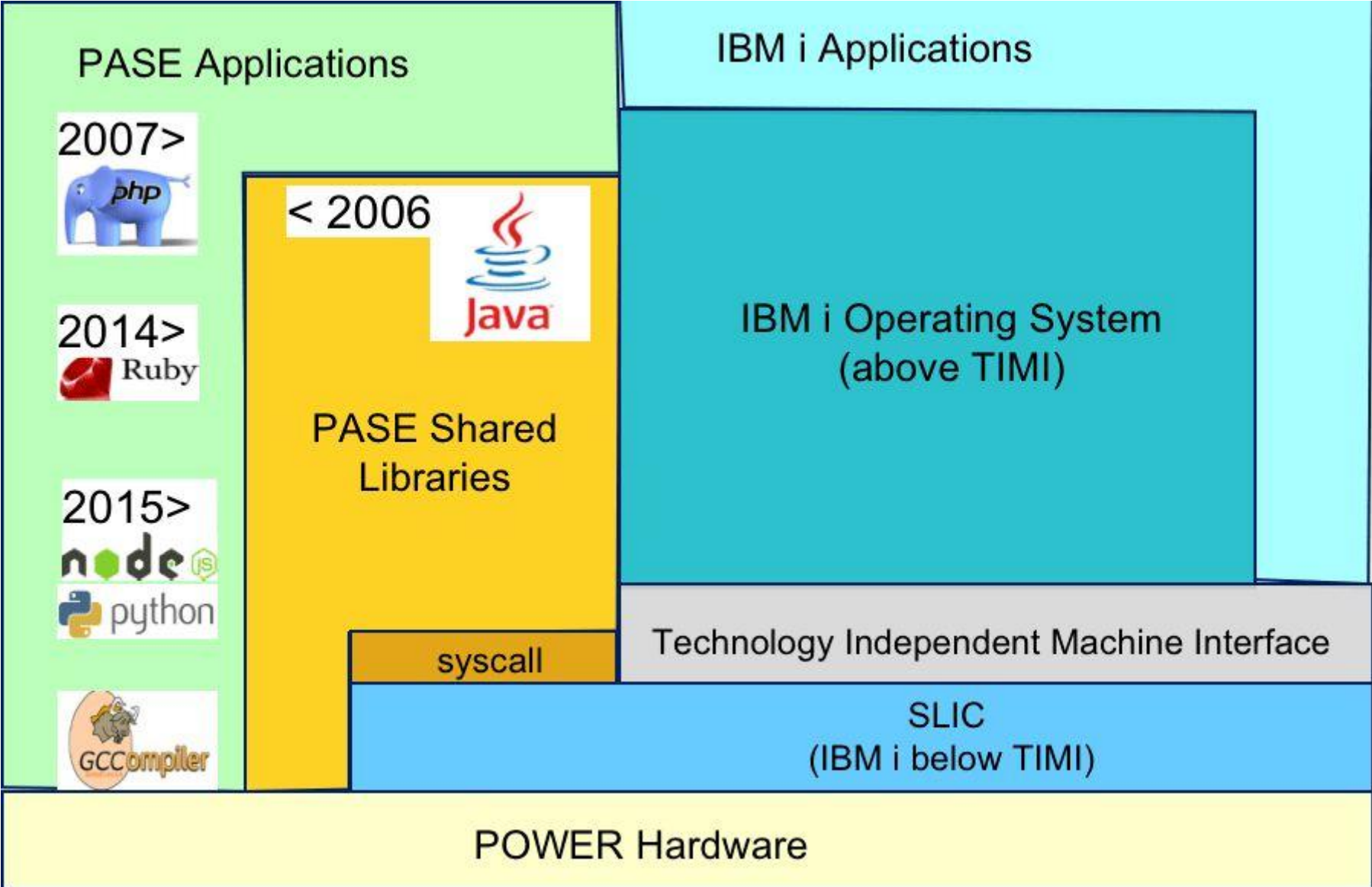
In case of police issue on ACS

Properties of C:\Users\Public\IBM\ClientSolutions\Start_Programs\Windows_x86-64
Change PPP parameters → Activate PPP → Activate replace scaling → Choose system



PASE & Unix-like

PASE (Portable Application Solutions Environment)



Prerequisites – LPP (Licensed Program Product)

- 5770SS1 (option 33)

```
Display Installed Licensed Programs
```

Licensed Program	Product Option	Description
5770SS1		Library QGPL
5770SS1		Library QUSRSYS
5770SS1	*BASE	IBM i
5770SS1	1	Extended Base Support
5770SS1	2	Online Information
5770SS1	3	Extended Base Directory Support
5770SS1	7	Example Tools Library
5770SS1	9	*PRV CL Compiler Support
5770SS1	12	Host Servers
5770SS1	13	System Openness Includes
5770SS1	30	Qshell
5770SS1	33	Portable App Solutions Environment
5770SS1	34	Digital Certificate Manager
5770DG1	*BASE	IBM HTTP Server for i

- 5773SC1 (option 1)

Licensed Program	Product Option	Description
5770JS1	*BASE	IBM Advanced Job Scheduler for i
5770JV1	*BASE	IBM Developer Kit for Java
5770JV1	16	Java SE 8 32 bit
5770JV1	17	Java SE 8 64 bit
5770JV1	19	Java SE 11 64 bit
5770PT1	*BASE	IBM Performance Tools for i
5770PT1	1	Performance Tools - Manager Feature
5770QU1	*BASE	IBM Query for i
5733SC1	*BASE	IBM Portable Utilities for i
5733SC1	1	OpenSSH, OpenSSL, zlib
5770ST1	*BASE	DB2 Query Mgr and SQL DevKit
5770TC1	*BASE	IBM TCP/IP Connectivity Utilities for i
5770TS1	*BASE	IBM Transform Services for i
5770TS1	1	Transforms - AFP to PDF Transform

Unix-like

- An execution environment that allows AIX applications to run on IBM i

```
EIF QIBM QOpenSys QSR bin chroots download etc lib lib64 opt pkgs root_path sbin tmp usr var
```

- Behaves similarly to a Unix system
- A Unix-style command-line interface and scripting environment
- If not well configured, you might get this type of errors:

```
Could not chdir to home directory /home/ZOUHAIR: No such file or directory  
$
```

Shell on 5250



Command	Environnement Type	Usage	Inter	Shell
STRQSH	IBM i native Unix-like shell	Unix-like command shell	Yes	qsh
CALL QP2TERM	PASE terminal (AIX runtime)	Korn shell terminal	Yes	sh (Korn)
CALL QP2SHELL	PASE command executor	PASE cmd from CL	No	sh (Korn)

Shell on 5250

Run a shell command/script inside a CL program: [QSH CMD\('/QOpenSys/pkg/bin/bash script.sh'\)](#)

- [STRQSH](#)

```
QSH Command Entry
$
```

- [CALL QP2TERM](#)

```
/QOpenSys/usr/bin/-sh
$
```

Optimal use of the shell on 5250: command [QP2TERM](#)

ULTIMATE use of shell: connect via SSH using a terminal like CMD/Powershell or PuTTY



Shell setup

QIBM_MULTI_THREADED

- Variable that enables multithreading for Qshell applications
- `ADDENVVAR ENVVAR(QIBM_MULTI_THREADED) VALUE('Y') LEVEL(*SYS)`
- `WRKENVVAR LEVEL(*SYS)`

```
Type options, press Enter.
  1=Add    2=Change  4=Remove  5=Display details  6=Print

Opt  Name                               Value
---  ---                               ---
_    PATH                               '/usr/bin:./QOpenSys/usr/bin:/Qope' >
_    ARCAD_HOME                          '/ArcadI fsPrd/arcad_home'
_    PASE_LANG                            'FR_FR'
_    QIBM_PASE_CCSID                      '1208'
_    ILE_DEBUGGER_1                       'ALLOW_WIDE_SCREEN'
_    JAVA_HOME                            '/QOpenSys/QIBM/ProdData/JavaVM/jdk' >
_    LANG                                  '/QSYS.LIB/FR_FR.LOCALE' >
_    QIBM_MULTI_THREADED                  'Y'
```

.profile (PATH)

- `echo 'export PATH="$HOME/.local/bin:/QOpenSys/pkgs/bin:$PATH:/QOpenSys/usr/bin:/usr/bin"' >> $HOME/.profile`
- When modifying the .profile configuration, you must apply it by typing `source $HOME/.profile` and perform a relogin of your session

```
bash $ echo $PATH
/home/zouhair/.local/bin:/QOpenSys/pkgs/bin:/QOpenSys/usr/bin:/usr/ccs/bin:/QOpenSys/usr/bin/X11:/usr/sbin:./usr/bin:/QOpenSys/usr/bin:/usr/bin
```

Comparison Qsh, Ksh, Bash

Feature	QShell (IBM i)	Korn Shell (ksh)	Bash
Origin	Unix-type shell developed by IBM (specifically for IBM i)	Developed by David Korn (derived from the Bourne Shell)	Bourne Again Shell (GNU project)
POSIX compliance	Partial POSIX compatibility	Very good POSIX compliance	Good POSIX compliance
Interactivity	Limited interactivity features	Interactive with command editing and history	Very interactive (tab completion, advanced history)
Scripting support	More limited, can run simple shell scripts	Very powerful for scripting, with extensions (associative arrays, floating point)	Feature-rich with many advanced capabilities
Performance	Sufficient for small scripts, less performant	Very fast, comparable to awk for text processing	Less performant than ksh in some scripts
Color/Customization	Limited customization	Customizable	Easy to customize and colorize

BASH (Bourne-Again SHell) – Method 1



- yum install bash

-- current user

```
CALL QSYS2.SET_PASE_SHELL_INFO('*CURRENT', '/QOpenSys/pkg/bin/bash');
```

-- specific user (requires special authorities *USER, *OBJMGT and *SECADM)

```
CALL QSYS2.SET_PASE_SHELL_INFO('USER', '/QOpenSys/pkg/bin/bash');
```

-- all users (requires *SECADM)

```
CALL QSYS2.SET_PASE_SHELL_INFO('*DEFAULT', '/QOpenSys/pkg/bin/bash');
```

BASH (Bourne-Again SHell) – Method 2

- `/QOpenSys/pkg/bin/chsh -s /QOpenSys/pkg/bin/bash`

```
-bash-5.2$
```

```
bash $ echo $SHELL  
/QOpenSys/pkg/bin/bash
```

.profile (prompt string 1)

- `echo "export PS1="\[\e[32m\]\u@\h \$ \[\e[0m\]" >> $HOME/.profile`

```
zouhair@COMEUR $
```

- `$$\e[32m$$` : ANSI color code for green text
- `\u` : current username
- `@` : user/host separator
- `\h` : hostname
- `\$` : \$ for regular user, # for root
- `$$\e[0m$$` : ANSI reset escape code (resets color to default so the green doesn't continue after the prompt)

.profile (environment language)

English

export LANG=EN_US.UTF-8

export LC_ALL=EN_US.UTF-8

```
bash $ locale
LANG=EN_US.UTF-8
LC_COLLATE="EN_US.UTF-8"
LC_CTYPE="EN_US.UTF-8"
LC_MONETARY="EN_US.UTF-8"
LC_NUMERIC="EN_US.UTF-8"
LC_TIME="EN_US.UTF-8"
LC_MESSAGES="EN_US.UTF-8"
LC_ALL=EN_US.UTF-8
```

.profile (alias/colors)

- alias ll='ls -al'
- alias diff='diff --color=auto'
- alias grep='grep --color=auto'
- alias ls='ls --color=auto'
- alias tree='tree -C'

```
bash $ ll $HOME
total 48
drwx--S--- 3 zouhair 0 8192 Nov 16 19:30 .
drwxrwsrwx 12 qsys   0 8192 Nov 16 17:17 █
-rw----- 1 zouhair 0 2444 Nov 17 15:22 .bash_history
-rw-r--r-- 1 zouhair 0 305 Nov 17 15:08 .profile
-rw----- 1 zouhair 0 2 Nov 16 19:13 .sh_history
drwx--S--- 2 zouhair 0 8192 Nov 16 17:20 .ssh
```

```
bash $ ls /Q0penSys/etc
alternatives  cron.daily  cron.weekly  freetds.conf  lftp.conf    magic        mc            pki           ssh           yum.repos.d
anacrontab   cron.deny   crontab      gcrypt        locales.conf  man_db.conf  nginx        pool.conf    ssl
ca-certificates  cron.hourly  dejagru     inputrc       logrotate.conf  mapepire    odbc.ini     profile      wgetrc
cron.d       cron.monthly  fonts      joe           logrotate.d    mariadb     odbcinst.ini  sc           yum
```

.profile (proxy)

```
export http_proxy="http://x.x.x.x:80"
```

```
export https_proxy="http://x.x.x.x:8080"
```

```
export HTTP_PROXY="$http_proxy"
```

```
export HTTPS_PROXY="$https_proxy"
```

```
bash $ curl -v https://www.ibm.com
* Trying 23.201.252.108:443...
* Connected to www.ibm.com (23.201.252.108) port 443
* ALPN: curl offers http/1.1
* TLSv1.3 (OUT), TLS handshake, Client hello (1):
* TLSv1.3 (IN), TLS handshake, Server hello (2):
* TLSv1.3 (IN), TLS handshake, Encrypted Extensions (8):
* TLSv1.3 (IN), TLS handshake, Certificate (11):
* TLSv1.3 (IN), TLS handshake, CERT verify (15):
* TLSv1.3 (IN), TLS handshake, Finished (20):
* TLSv1.3 (OUT), TLS change cipher, Change cipher spec (1):
* TLSv1.3 (OUT), TLS handshake, Finished (20):
* SSL connection using TLSv1.3 / TLS_AES_256_GCM_SHA384
* ALPN: server accepted http/1.1
* Server certificate:
* subject: C=US; ST=New York; L=Armonk; O=International Business Machines Corporation; CN=www.ibm.com
```

PASE Environment

```
bash $ env
SHELL=/QOpenSys/pkgs/bin/bash
PWD=/home/zouhair
LOGNAME=zouhair
TZ=<UTC>0
HOME=/home/zouhair
LANG=EN_US.UTF-8
SSH_CONNECTION=[REDACTED] 22
TERM=xterm-256color
USER=zouhair
LOGIN=zouhair
SHLVL=1
PASE_USRGRP_LIMITED=N
PS1=\[\e[92m\]bash $\[\e[0m\]
SSH_CLIENT=[REDACTED] 22
LC_ALL=EN_US.UTF-8
PATH=/home/zouhair/.local/bin:/QOpenSys/pkgs/bin:/QOpenSys/usr/bin:/usr/ccs/bin:/QOpenSys/usr/bin/X11:/usr/sbin:./usr/bin:/QOpenSys
/usr/bin:/usr/bin
MAIL=/var/spool/mail/zouhair
SSH_TTY=/dev/pts/1
```

Customize your banner

- Banner : `/QOpenSys/QIBM/UserData/SC1/OpenSSH/etc/sshd_config`
- Welcome message : `/QOpenSys/etc/profile`

```
PS C:\Users\ZouhairOulli> ssh user@partition

Welcome to the IBM i shell environment of "hostname"

Date and time Fri Oct 31 11:53:03 CET 2025

Filesystem      Type  Size  Used Avail Use% Mounted on
/                root  2.1T  1.1T  1.1T  52% /

You are connected with the user "profile"

Your current shell is "/QOpenSys/pkg/bin/bash"
```

Navigation in Bash

- `Ctrl + L` → clear the terminal
- `Ctrl + E` → move to the right (End on IBM i)
- `Ctrl + A` → move to the left (Tab on IBM i)
- `logout` → (SIGNOFF on IBM i)

- `<command> --help` → manual (F1 on IBM i)

Essential PASE for i commands

- `bg` → Run a job in the background
- `cat` → Concatenate or display files
- `cd` → Change the current directory
- `chmod` → Change permission modes
- `chown` → Change the user associated with a file

- `cl 'command'` → run a cl command

```
bash $ cl 'DSPSYSVAL SYSVAL(QCCSID)'
```

```
CPD000D: Command *LIBL/DSPSYSVAL not safe for a multithreaded job.
```

```
System Values
```

```
Page 1
```

```
5770SS1 V7R5M0 220415
```

```
COMEUR 25-11-17 15:40:20 UTC
```

```
Current
```

```
Shipped
```

```
Name value
```

```
value
```

```
Description
```

```
QCCSID > 1141
```

```
65535
```

```
Coded character set identifier
```

```
Note: > means current value is different from the shipped value
```

```
***** END OF LISTING *****
```

Essential PASE for i commands

- `clear` → Clear the terminal screen
- `cmp` → Compare two files
- `cp` → Copy file

- `curl` → Transferring data with URLs

```
bash $ curl -v https://www.ibm.com
* Trying 23.201.252.108:443...
* Connected to www.ibm.com (23.201.252.108) port 443
* ALPN: curl offers http/1.1
* TLSv1.3 (OUT), TLS handshake, Client hello (1):
* TLSv1.3 (IN), TLS handshake, Server hello (2):
* TLSv1.3 (IN), TLS handshake, Encrypted Extensions (8):
* TLSv1.3 (IN), TLS handshake, Certificate (11):
* TLSv1.3 (IN), TLS handshake, CERT verify (15):
* TLSv1.3 (IN), TLS handshake, Finished (20):
* TLSv1.3 (OUT), TLS change cipher, Change cipher spec (1):
* TLSv1.3 (OUT), TLS handshake, Finished (20):
* SSL connection using TLSv1.3 / TLS_AES_256_GCM_SHA384
* ALPN: server accepted http/1.1
* Server certificate:
* subject: C=US; ST=New York; L=Armonk; O=International Business Machines Corporation; CN=www.ibm.com
```

Essential PASE for i commands

- `date` → Display or set the date or time
- `df` → Reports information about space on file systems

```
bash $ df -Th
```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/QASP01	none	467G	274G	194G	59%	/dev/QASP01
/QOPT	qopt	-	-	-	-	/QOPT
/QSYS.LIB	qsys	467G	274G	194G	59%	/QSYS.LIB
/QDLS	qdls	467G	274G	194G	59%	/QDLS
/QOpenSys	qopensys	467G	274G	194G	59%	/QOpenSys
/	root	467G	274G	194G	59%	/

- `diff` → Compare text files
- `du` → Summarize disk usage

Essential PASE for i commands

- `file` → Determine file type
- `find` → Find files with a matching expression
- `grep` → Search a file for a pattern
- `head` → Display the first few lines or bytes of a file or files
- `hostname` → Set or display the name of the current host system
- `mkdir` → Create one or more new directories
- `mv` → Move files
- `ls` → Display the contents of a directory

Essential PASE for i commands

- `ps` → Show current status of processes
- `rm` → Remove (unlink) files or directories
- `rmdir` → remove directory

- `stat file` → File status

```
bash $ stat .ssh
  File: '.ssh'
  Size: 8192          Blocks: 16          IO Block: 8192   directory
Device: 8000804000000001h/9223513049221038081d Inode: 259108     Links: 2
Access: (2700/drwx--S---)  Uid: ( 124/ zouhair)  Gid: (   0/ UNKNOWN)
Access: 2025-11-16 17:20:34.000000000 +0000
Modify: 2025-11-16 17:20:27.000000000 +0000
Change: 2025-11-16 17:20:27.000000000 +0000
 Birth: -
```

Essential PASE for i commands

- `system` → Run a CL command

```
bash $ system "DSPUSRPRF QSECOFR"
                                     Display User Profile - *BASIC
5770SS1 V7R5M0 220415
User Profile . . . . . : QSECOFR
Previous sign-on . . . . . : 25-11-17 04:54:53
Password verifications not valid . . . . . : 0
Status . . . . . : *ENABLED
Date password last changed . . . . . : 25-11-09 21:44:18
Password is *NONE . . . . . : *NO
Password expiration interval . . . . . : *SYSVAL
Password set expired by command . . . . . : *NO
Block password change . . . . . : *NONE
Local password management . . . . . : *YES
Maximum sign-on attempts . . . . . : *SYSVAL
User class . . . . . : *SECOFR
Creation date/time . . . . . : 22-07-05 13:14:56
Created by user . . . . . : *IBM
Change date/time . . . . . : 25-11-17 15:22:11
```

- `sysval` → Run the QShell `sysval` command to display an IBM i system value or network attribute

```
bash $ sysval QSECURITY
```

Essential PASE for i commands

- `ssh -vvv` → mode verbose
- `touch` → Update the access and modification times of a file
- `tail` → Prints the last N number of data of the given input

- `uname` → Provides all available information about the system, including the kernel name, version and machine architecture

```
bash $ uname -a
OS400 partition 5 7 serial number powerpc 0s
```

- `wc` → Count lines, words, bytes in file
- `which` → Locate a program file, including aliases and paths
- `whoami` → Which user am I connected with
- `logout` → Sign off

Essential PASE for i commands

- Find files by name → `find /QOpenSys/ -type f -iname "sshd_config"`

```
bash $ find /QOpenSys/ -type f -iname "sshd_config"
/QOpenSys/QIBM/ProdData/SC1/OpenSSH/etc_template/sshd_config
/QOpenSys/QIBM/UserData/SC1/OpenSSH/etc/sshd_config
/QOpenSys/etc/ssh/sshd_config
```

- Search a file by keyword name → `find / -name 'python3.9' 2>/dev/null`

```
bash $ find / -name 'python3.9' 2>/dev/null
/QOpenSys/pkgs/lib/python3.9
/QOpenSys/pkgs/bin/python3.9
```

Essential PASE for i commands

- Find files by extension → `find . type f -iname "*_config"`

```
bash $ cd /QOpenSys/QIBM/UserData/SC1/OpenSSH/etc/  
bash $ find . type f -iname "*_config"  
./ssh_config  
./sshd_config
```

- Find files by size (less than) → `find <path> -type f -size -1G`
- Find files by size (more than) → `find <path> -type f -size +5G`
- Find files by size (between two values) → `find <path> -type f -size +100M -size 1G`
- Find files owned by a user → `find <path> -user qsys`

Essential PASE for i commands

- Find files by permission → `find . -perm 600`

```
bash $ find . -perm 600
./ssh_host_rsa_key
./ssh_host_ecdsa_key
./ssh_host_ed25519_key
```

- Find directory and change permission → `find .ssh/authorized_keys -type d -exec chmod 600 {} \;`
- Find files by modification date (modified today) → `find . -name "*_config" -mtime 0`
- Find and delete files → `find /var/log/ -name "*tmp" -delete`
- Find files directory and change permission → `find .ssh/authorized_keys -type d -exec chmod 600 {} \;`
- Find files older than 7 days and execute shell command with CL program to delete them → QSH ('`find /home/user -type f -mtime +7 -exec /bin/rm -f {} \'`)

Bash script to automate the configuration ([link](#))

```
#!/bin/bash
```

The screenshot shows a GitHub repository page for 'zouhair-oulli / Scripts-for-IBMi'. The file 'pase_config.sh' is selected, showing its content. The script is a Bash script that automates the configuration of PASE, shell, and SSH permissions on IBM i. It includes prompts for user profile and checks for the existence of the home directory.

```
1  #!/QOpenSys/pkg/bin/bash
2
3  echo " "
4  echo -e "\e[36mHello $USER, you are running a script to configure PASE, shell and SSH permissions on IBM i (initial setup)\e[0m"
5  echo " "
6  echo -e "\e[31mNote: in case of a typing error, or if you would like to cancel the program, press Ctrl + C\e[0m"
7  echo " "
8
9  # prompt and read user profil
10 read -p "Please, enter the user profil you would like to configure: " -r user
11
12 # check if user string is empty
13 if [[ -z "$user" ]]; then
14     printf '\e[31m%s\e[0m\n' "No user profile entered! Please try again."
15     exit 1
16 else
17     echo "-----"
18     #echo " "
19
20 # creating and changing ownership/permissions
21 echo -e "\e[32m==> Creating, changing ownership and permissions for /home/$user + .profile + .ssh + authorized_keys \e[0m"
22
23 # is there home directory (nothing to do), if not (create it)
24 if ! test -d /home/$user; then
25     echo " "
26     echo "/home/$user doesn't exist - creating it..."
27     mkdir /home/$user
28 fi
```

Bash script to automate the PASE/Shell configuration

```
Hello zouhair, you are running a script to configure PASE, shell and SSH permissions on IBM i (initial setup)
```

```
Note: in case of a typing error, or if you would like to cancel the program, press Ctrl + C
```

```
Please, enter the user profil you would like to configure: pase
```

```
=====  
==> Creating, changing ownership and permissions for /home/pase + .profile + .ssh + authorized_keys
```

```
/home/pase doesn't exist - creating it...
```

```
/home/pase/.profile doesn't exist - creating it...
```

```
/home/pase/.ssh doesn't exist - creating it...
```

```
/home/pase/.ssh/authorized_keys doesn't exist - creating it...
```

```
* PERMISSIONS *
```

```
drwx--S--- 3 pase 0 8192 Jan  6 17:43 /home/pase
```

```
-rw----- 1 pase 0 0 Jan  6 17:43 /home/pase/.profile
```

```
drwx--S--- 2 pase 0 8192 Jan  6 17:43 /home/pase/.ssh
```

```
-rw----- 1 pase 0 0 Jan  6 17:43 /home/pase/.ssh/authorized_keys  
=====
```

Bash script to automate the PASE/Shell configuration

```
==> Configuring PATH
```

```
Current PATH is now: $HOME/.local/bin:/QOpenSys/pkgs/bin:$PATH:/QOpenSys/usr/bin:/usr/bin
```

```
==> Specifying HOMEDIR path name and UTF-8 character conversion
```

```
CPC2205: User profile PASE changed.
```

```
==> Installing and configuring BASH
```

```
Setting up Install Process
```

```
Package bash-5.2-2.ppc64 already installed and latest version
```

```
Nothing to do
```

```
Current shell is now: /QOpenSys/pkgs/bin/bash
```

```
==> Configuring PS1
```

```
Prompt string is now: zouhair@ host.domain.com pwd $
```

```
==> Configuring colors
```

```
. █ .profile █ .ssh
```

```
Setting up the PASE, shell and SSH permissions for the user pase is finished :)
```

```
Reminder: if you launched this script for the user you are signed in with, apply the configuration by relogging or launching a new shell with command "exec $SHELL -l"
```

IBM i courses

- [Introduction to IBM i](#)
- [System management](#)
- [Security](#)
- [Auditing and logging](#)
- [PTF \(Program Temporary Fix\)](#)
- [CL \(Control Language\)](#)
- [PASE and Unix-like on IBM i](#)
- [Ansible for IBM i](#)



Sharing is caring

Q&A (?)

Thank you

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