



# IBM i Open-Source Workshop

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IBM Champion 2021, 2022 & 2023





# Presenter - Andy Youens





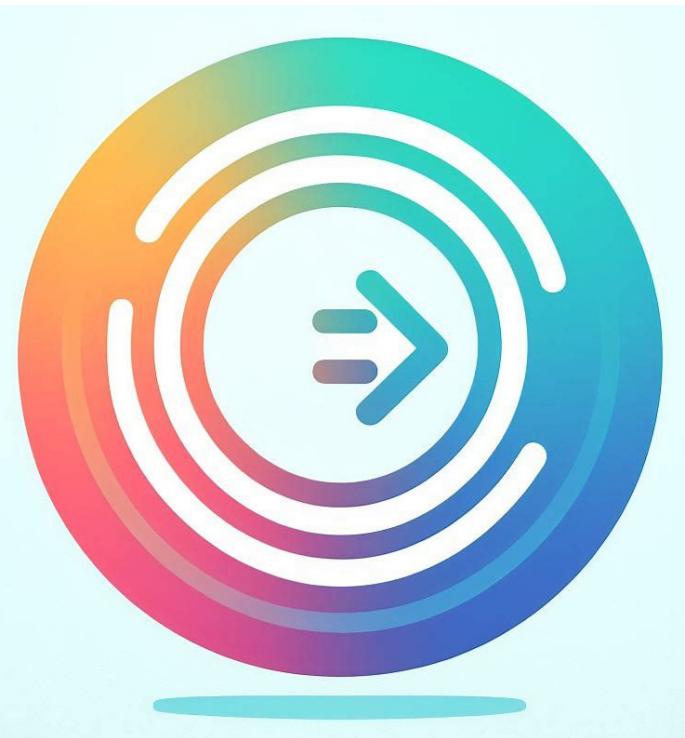
- We are proud to be a leading IBM i software vendor with a remarkable track record of over 33 years
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- Give me a shout!



# Agenda



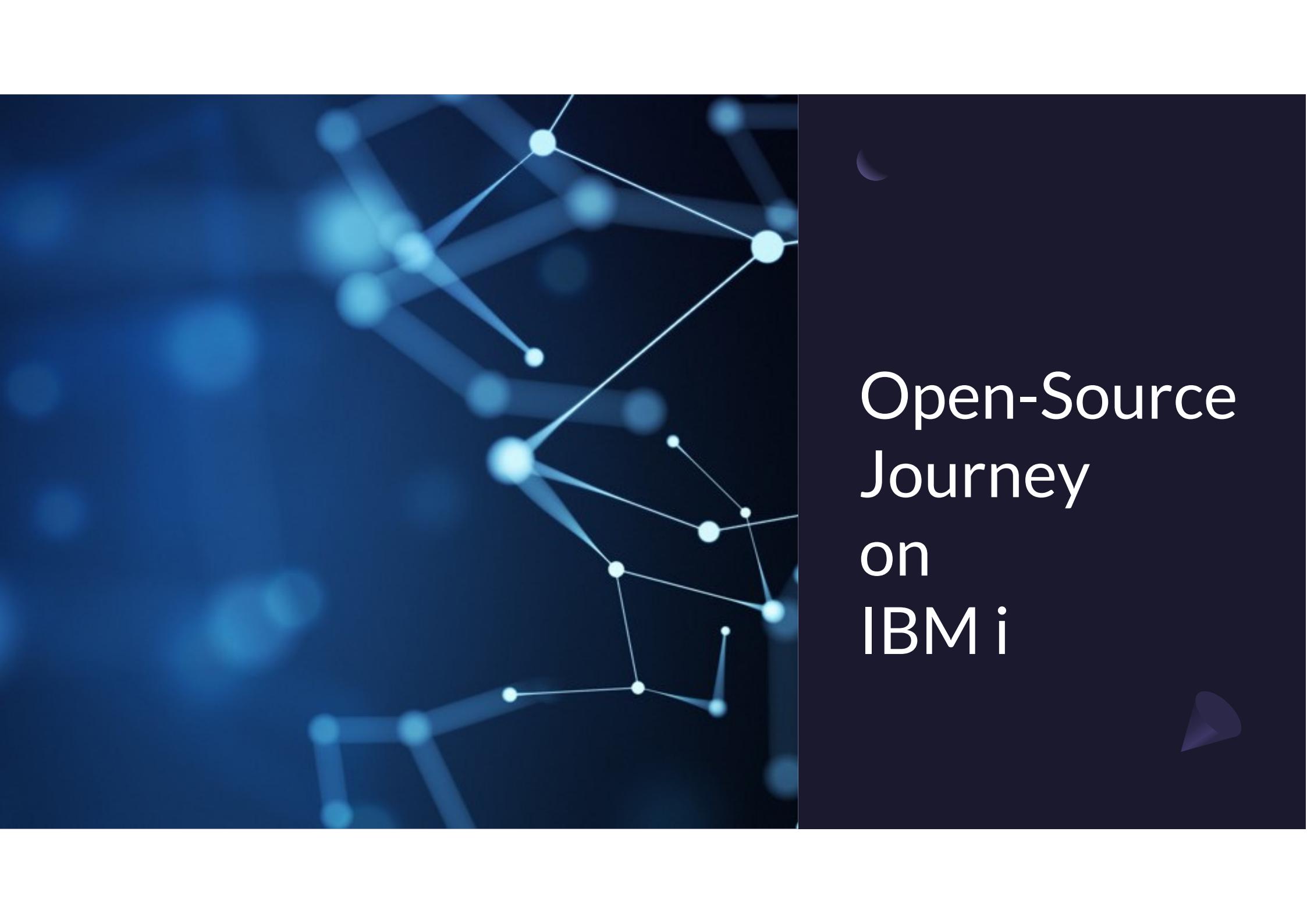
## Open-Source Journey

Open-Source Installation

Using Open-Source

Shells

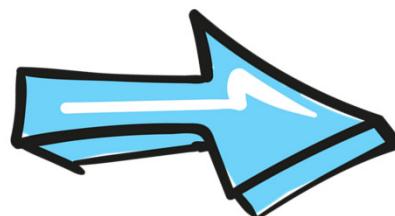
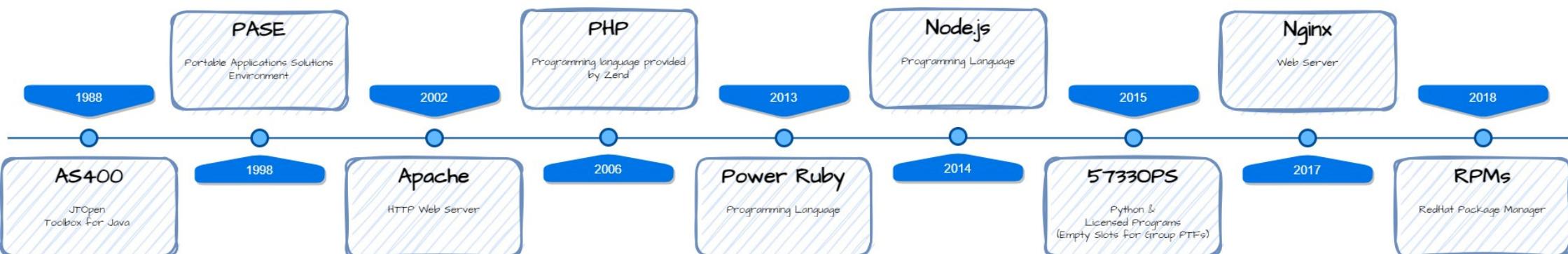
IDEs & Tools

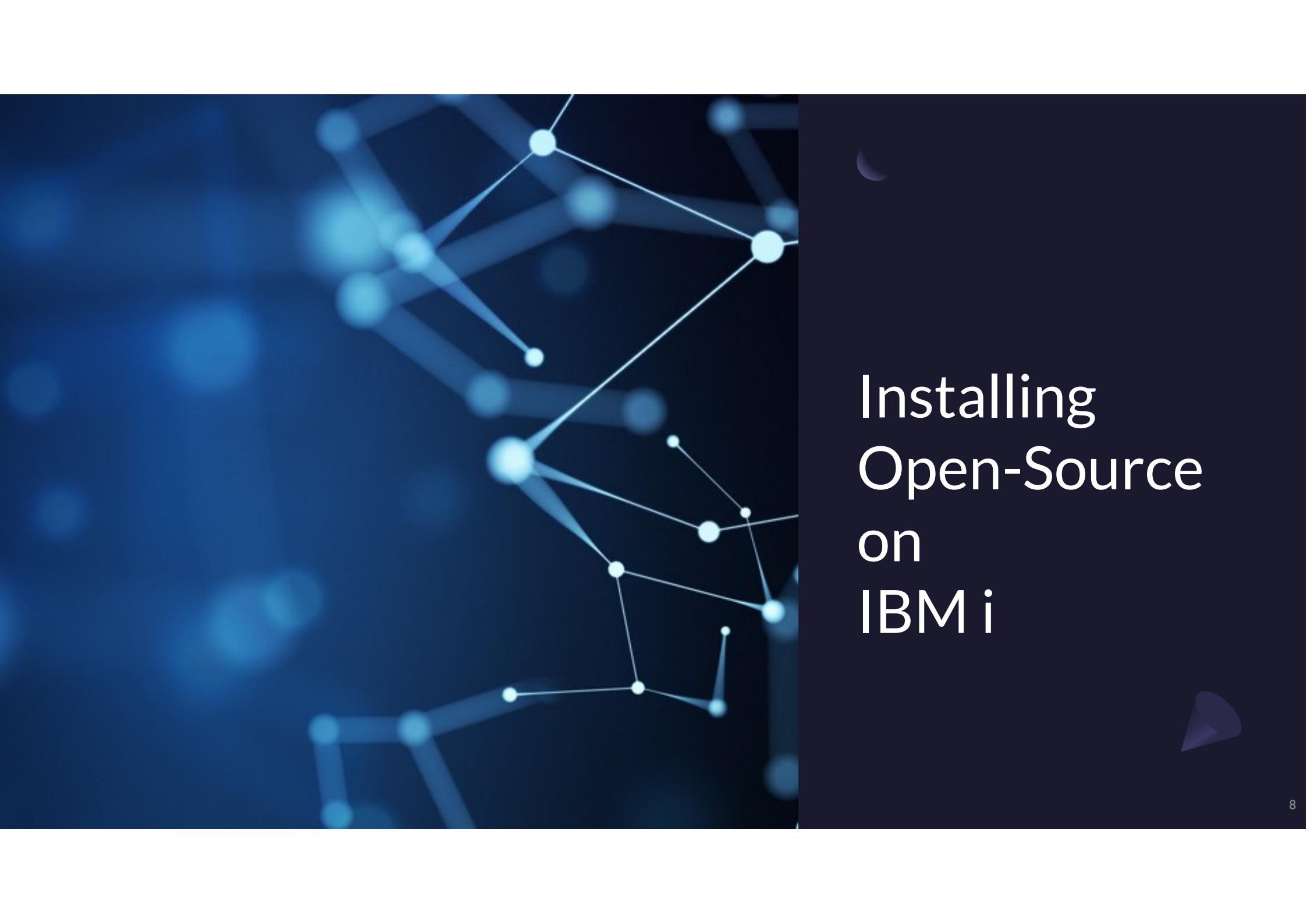
A dark blue background featuring a complex, glowing network graph composed of numerous small, semi-transparent blue spheres connected by thin white lines, creating a sense of depth and connectivity.

# Open-Source Journey on IBM i



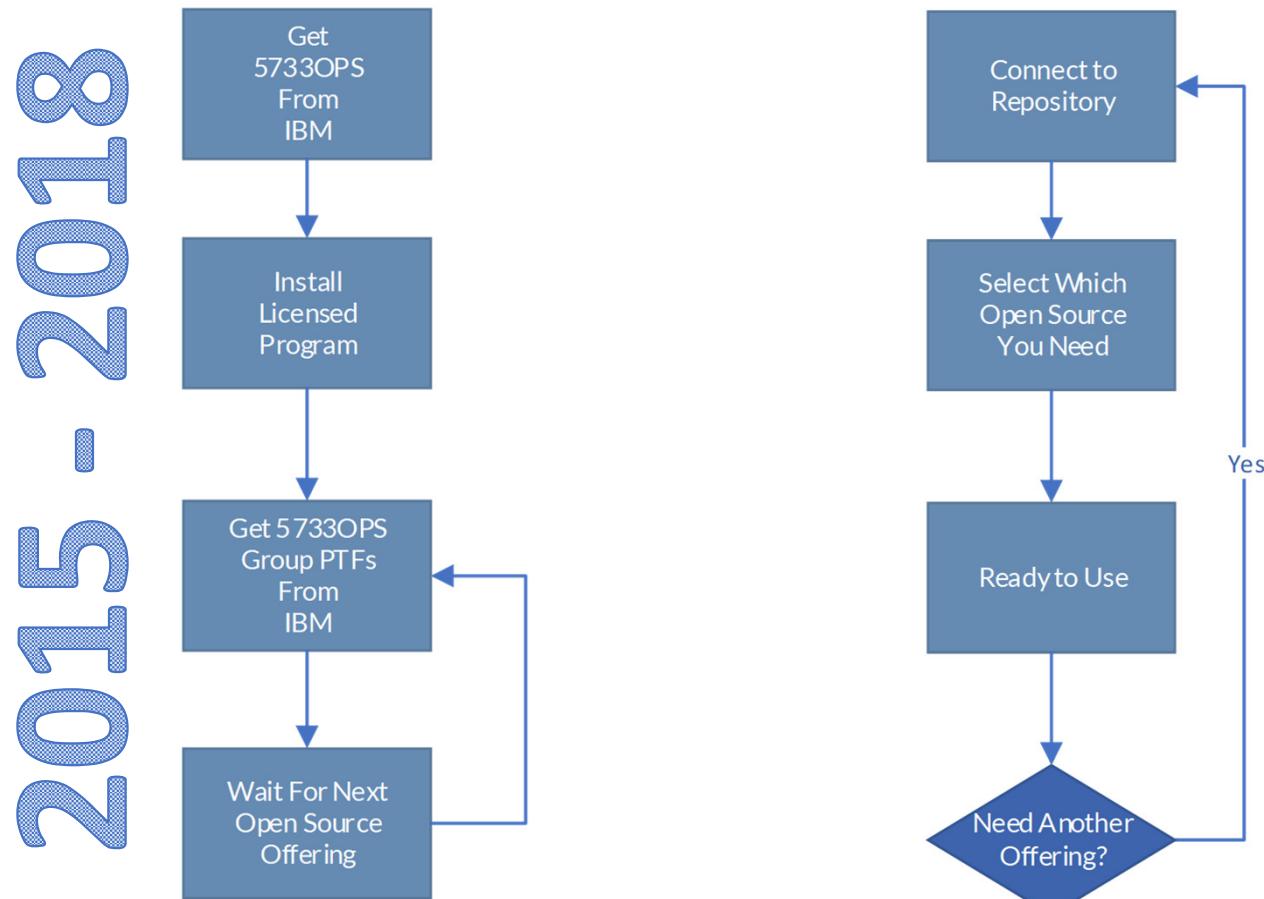
# Open-Source Timeline on IBM i



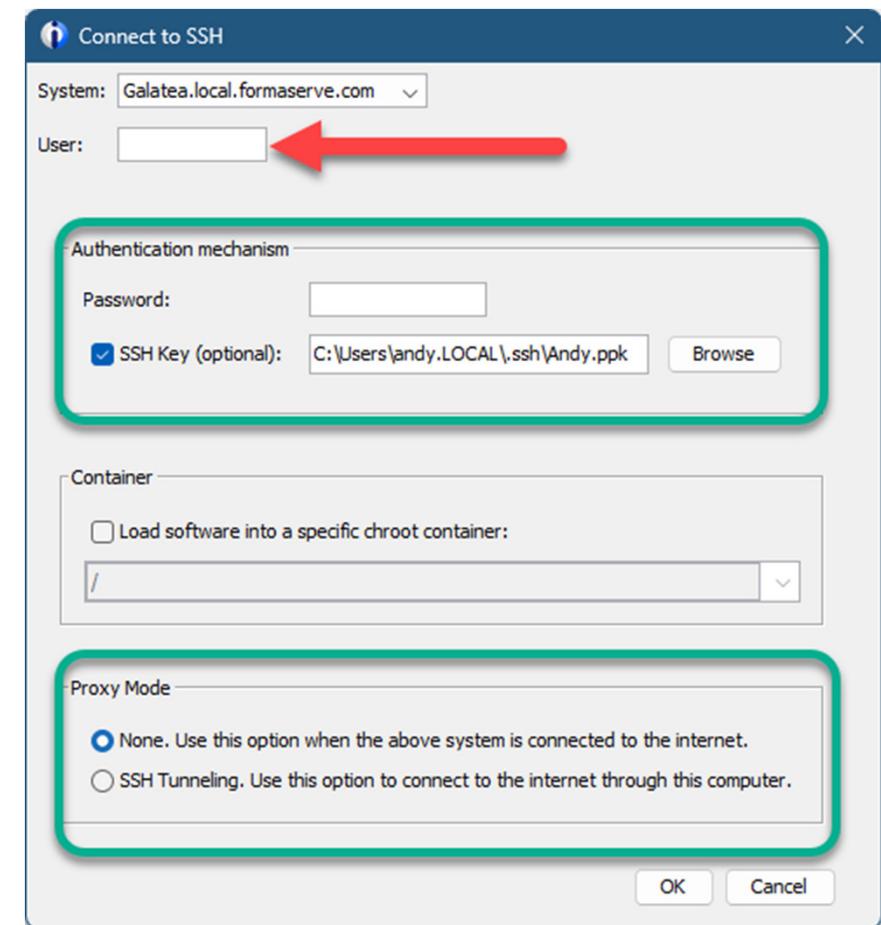
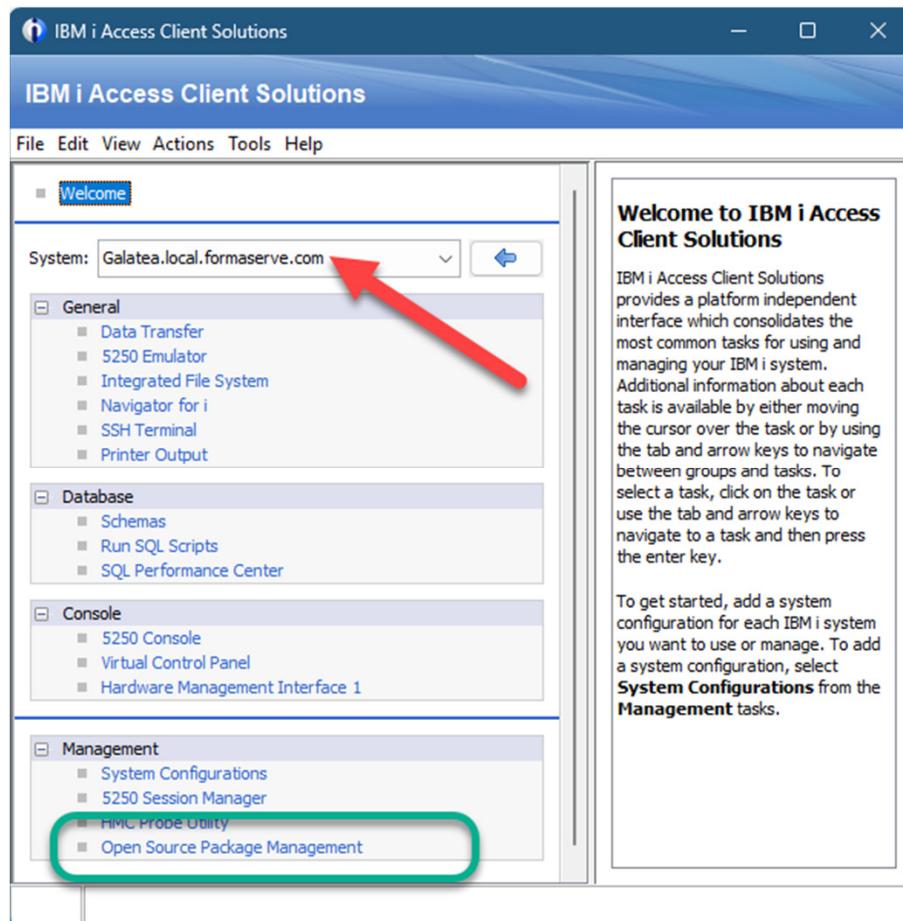
A dark blue background featuring a complex, glowing network graph composed of numerous small, semi-transparent blue spheres connected by thin white lines, creating a sense of depth and connectivity.

# Installing Open-Source on IBM i

# Software Flow

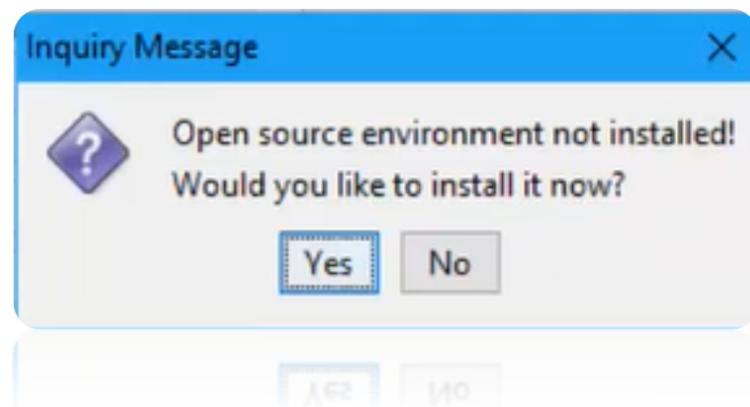


# Installing Open-Source Packages - ACS



# No Open-Source Installed?

- Not a problem!
- Connecting for the first time, the GUI will prompt.  
**Go for a coffee!**



# RPM Repositories

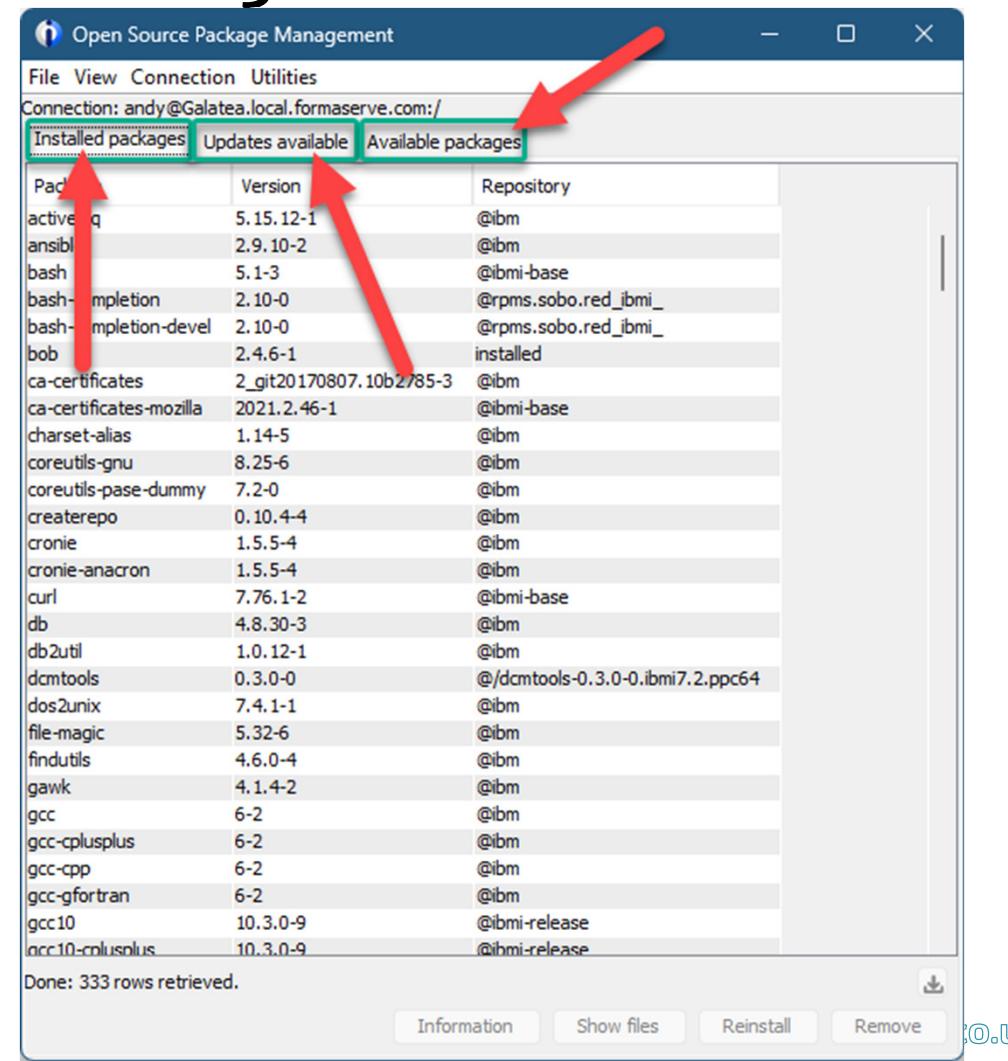
- IBM has created a RPM repository for Open-Source packages
- RPM packages are stored in a repositories - aka repo
- They are not AIX/Unix RPMs
- They are IBM i RPMs shipping IBM i software
- Compiled for & are known to run on IBM i
- Built on IBM i for IBM i**



# Installing Open-Source Packages

## • Tabs for

- **Installed** packages
- **Updates** available
- **Available** packages



The screenshot shows the 'Open Source Package Management' application window. At the top, there is a menu bar with 'File', 'View', 'Connection', and 'Utilities'. Below the menu is a connection status bar: 'Connection: andy@Galatea.local.formaserve.com:/'. Underneath the connection bar are three tabs: 'Installed packages' (highlighted with a red arrow), 'Updates available' (highlighted with a red arrow), and 'Available packages'. The main area of the window is a table displaying package information. The columns are 'Package', 'Version', and 'Repository'. The table lists numerous packages, such as active, bash, bob, ca-certificates, curl, db, db2util, dcmtools, dos2unix, file-magic, findutils, gawk, gcc, gcc-cplusplus, gcc-cpp, gcc-gfortran, gcc10, and gcc10-colusplus. The 'Repository' column indicates where each package is installed or available, such as @ibm, @ibm-base, or @ibmi-release. At the bottom of the table, a message says 'Done: 333 rows retrieved.' Below the table are four buttons: 'Information', 'Show files', 'Reinstall', and 'Remove'.

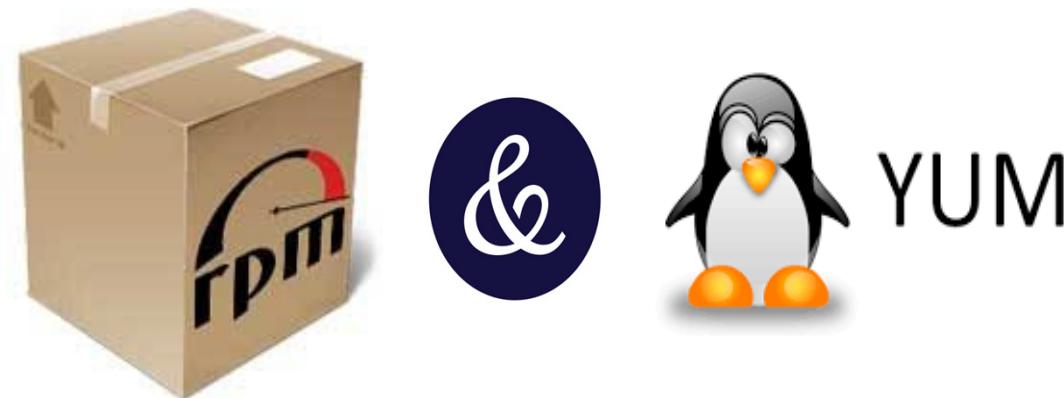
Package	Version	Repository
active	5.15.12-1	@ibm
ansible	2.9.10-2	@ibm
bash	5.1-3	@ibm-base
bash-completion	2.10-0	@rpms.sobo.red_ibmi_
bash-completion-devel	2.10-0	@rpms.sobo.red_ibmi_
bob	2.4.6-1	installed
ca-certificates	2_git20170807.10b2785-3	@ibm
ca-certificates-mozilla	2021.2.46-1	@ibm-base
charset-alias	1.14-5	@ibm
coreutils-gnu	8.25-6	@ibm
coreutils-pase-dummy	7.2-0	@ibm
createrepo	0.10.4-4	@ibm
cronie	1.5.5-4	@ibm
cronie-anacron	1.5.5-4	@ibm
curl	7.76.1-2	@ibm-base
db	4.8.30-3	@ibm
db2util	1.0.12-1	@ibm
dcmtools	0.3.0-0	@/dcmtools-0.3.0-0.ibmi7.2.ppc64
dos2unix	7.4.1-1	@ibm
file-magic	5.32-6	@ibm
findutils	4.6.0-4	@ibm
gawk	4.1.4-2	@ibm
gcc	6-2	@ibm
gcc-cplusplus	6-2	@ibm
gcc-cpp	6-2	@ibm
gcc-gfortran	6-2	@ibm
gcc10	10.3.0-9	@ibmi-release
gcc10-colusplus	10.3.0-9	@ibmi-release

Done: 333 rows retrieved.

Information Show files Reinstall Remove

# Yum - What is it?

- **Yellow Dog Updater Modified!**
- Yum is an automatic updater & package installer/remover
- It automatically handles dependencies
- Yum works with software repositories – it uses RPM!
- **A licensed program & PTF process in one!**



# Yum

- Runs in **PASE (more in a mo!)**
- In remote shells
  - Windows SSH Client
  - Chrome SSH Plugin
  - Putty
  - Git Bash
  - OpenSSH
- SSH Server must be running -  
**StrTcpSvr \*SSHD**





# Yum Repo List

- Use **yum repolist** to show all the repositories you are connected to

A screenshot of a Windows terminal window titled "Windows PowerShell". The terminal shows the command "andy@GALATEA /iug \$ yum repolist" highlighted with a red box. The output of the command is displayed below:

```
andy@GALATEA /iug $ yum repolist
repo id          repo name
ibm              ibm
repos.zend.com_ibmiphp_ppc64
repolist: 983
andy@GALATEA /iug $
```



# Yum Commands

- **yum list installed** - list installed packages
- **yum list updates** - list available updates to packages
- **yum list available** - list available packages
- **yum help** – help text
- **yum install <package>** - install a package
- **yum search <package>** - search for a package
- **yum erase <package>** - remove a package
- **yum repolist** – what repo's am I using?

# ACS Uses Yum!

Behind the Scenes!



```
Package Installation
Setting up Install Process
Resolving Dependencies
--> Running transaction check
---> Package curl-ppc64 0:7.70.0-3 will be updated
---> Package curl-ppc64 0:7.76.1-1 will be an update
---> Processing Dependency: libcurl4 = 7.76.1-1 for package: curl-7.76.1-1.ppc64
--> Running transaction check
---> Package libcurl4-ppc64 0:7.70.0-3 will be updated
---> Package libcurl4-ppc64 0:7.76.1-1 will be an update
---> Processing Dependency: lib:/QOpenSys/pkg/lib/libbrotlidec.so.1(shr_64.o)(ppc64) for package: libcurl4-7.76.1-1.ppc64
---> Processing Dependency: lib:/QOpenSys/pkg/lib/libidn2.so.0(shr_64.o)(ppc64) for package: libcurl4-7.76.1-1.ppc64
--> Running transaction check
---> Package libbrotlidec1-ppc64 0:1.0.9-1 will be installed
---> Processing Dependency: lib:/QOpenSys/pkg/lib/libbrotlicommon.so.1(shr_64.o)(ppc64) for package: libbrotlidec1-1.0.9-1.ppc64
---> Package libidn2-0.ppc64 0:2.3.0-2 will be installed
--> Running transaction check
---> Package libbrotlicommon1-ppc64 0:1.0.9-1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved
=====
Package          Arch      Version       Repository   Size
=====
Updating:
curl            ppc64    7.76.1-1     ibm          121 K
Installing for dependencies:
libbrotlicommon1 ppc64    1.0.9-1      ibm          69 K
libbrotlidec1   ppc64    1.0.9-1      ibm          34 K
libidn2-0        ppc64    2.3.0-2      ibm          266 K
Updating for dependencies:
libcurl4         ppc64    7.76.1-1     ibm          432 K

Transaction Summary
=====
Install  3 Packages
Upgrade  2 Packages

Total download size: 922 k
Is this ok [Y/N]: |
```



YUM

# How Often should I Update My Open-Source?

- IBMs  
Recommendation
  - Monthly
- If you currently load PTFs every 6 months, include Open-Source within that procedure

2023  FormaServe 2024

January						
Wk	Mo	Tu	We	Th	Fr	Sa
52					1	
1	2	3	4	5	6	7
2	9	10	11	12	13	14
3	16	17	18	19	20	21
4	23	24	25	26	27	28
	30	31				

February						
Wk	Mo	Tu	We	Th	Fr	Sa
5	1	2	3	4	5	6
6	13	14	15	16	17	18
7	20	21	22	23	24	25
8	27	28				

March						
Wk	Mo	Tu	We	Th	Fr	Sa
9	1	2	3	4	5	6
10	13	14	15	16	17	18
11	20	21	22	23	24	25
12	27	28	29	30	31	

January						
Wk	Mo	Tu	We	Th	Fr	Sa
1	1	2	3	4	5	6
2	8	9	10	11	12	13
3	15	16	17	18	19	20
4	22	23	24	25	26	27
5	29	30	31			

February						
Wk	Mo	Tu	We	Th	Fr	Sa
6	1	2	3	4	5	6
7	12	13	14	15	16	17
8	19	20	21	22	23	24
9	26	27	28			

March						
Wk	Mo	Tu	We	Th	Fr	Sa
3	1	2	3	4	5	6
10	4	5	6	7	8	9
11	11	12	13	14	15	16
12	18	19	20	21	22	23
13	25	26	27	28	29	30

April						
Wk	Mo	Tu	We	Th	Fr	Sa
13	1	2	3	4	5	6
14	3	4	5	6	7	8
15	10	11	12	13	14	15
16	17	18	19	20	21	22
17	24	25	26	27	28	29

May						
Wk	Mo	Tu	We	Th	Fr	Sa
18	1	2	3	4	5	6
19	8	9	10	11	12	13
20	15	16	17	18	19	20
21	22	23	24	25	26	27
22	29	30	31			

June						
Wk	Mo	Tu	We	Th	Fr	Sa
14	1	2	3	4	5	6
15	8	9	10	11	12	13
16	15	16	17	18	19	20
17	22	23	24	25	26	27
18	29	30	31			

April						
Wk	Mo	Tu	We	Th	Fr	Sa
18	1	2	3	4	5	6
19	6	7	8	9	10	11
20	13	14	15	16	17	18
21	20	21	22	23	24	25
22	27	28	29	30	31	

May						
Wk	Mo	Tu	We	Th	Fr	Sa
18	1	2	3	4	5	6
19	6	7	8	9	10	11
20	13	14	15	16	17	18
21	20	21	22	23	24	25
22	27	28	29	30	31	

June						
Wk	Mo	Tu	We	Th	Fr	Sa
22	1	2	3	4	5	6
23	3	4	5	6	7	8
24	10	11	12	13	14	15
25	17	18	19	20	21	22
26	24	25	26	27	28	29

July						
Wk	Mo	Tu	We	Th	Fr	Sa
26	1	2	3	4	5	6
27	3	4	5	6	7	8
28	10	11	12	13	14	15
29	17	18	19	20	21	22
30	24	25	26	27	28	29

August						
Wk	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
32	7	8	9	10	11	12
33	14	15	16	17	18	19
34	21	22	23	24	25	26
35	28	29	30	31		

September						
Wk	Mo	Tu	We	Th	Fr	Sa
27	1	2	3	4	5	6
28	8	9	10	11	12	13
29	15	16	17	18	19	20
30	22	23	24	25	26	27
31	29	30	31			

October						
Wk	Mo	Tu	We	Th	Fr	Sa
40	1	2	3	4	5	6
41	8	9	10	11	12	13
42	15	16	17	18	19	20
43	22	23	24	25	26	27
44	29	30	31			

November						
Wk	Mo	Tu	We	Th	Fr	Sa
45	1	2	3	4	5	6
46	8	9	10	11	12	13
47	15	16	17	18	19	20
48	22	23	24	25	26	27
49	29	30	31			

December						
Wk	Mo	Tu	We	Th	Fr	Sa


<tbl\_r cells="7" ix="

# CL Program to Update Packages

- Can be run with existing procedures
- Can be tailored to fix your requirements
- Produces a PDF of all packages updated for auditing purposes
- Example on [github.com/formaserve/user-groups](https://github.com/formaserve/user-groups)

```
/****************************************************************************
 * Automate OSS Package Updates
 * Andy Youens
 * © 1990 - 2020 FormaServe Systems Ltd
 * Publish in PowerWire in March 2019
 * Article can be found at
 * https://powerwire.eu/open-source-updates
 */
Start:    Pgm
          Dcl      &Date      *char      6
          Dcl      &Mbr       *char      10
          Dcl      &IFSDir    *Char     256 Value( '/oss/logs/' )
          Dcl      &Time      *Char      6
          Dcl      &FullName  *Char     256
          Dcl      &PDFName   *Char    640

          Dcl      &MsgId    *Char      7
          Dcl      &MsgDta   *Char    256
          Dcl      &MsgF     *Char      10
          Dcl      &MsgfLib  *Char      10
          Dcl      &ErrorSw  *Lgl

          Copyright '© 1990 - 2020 FormaServe Systems Ltd.'

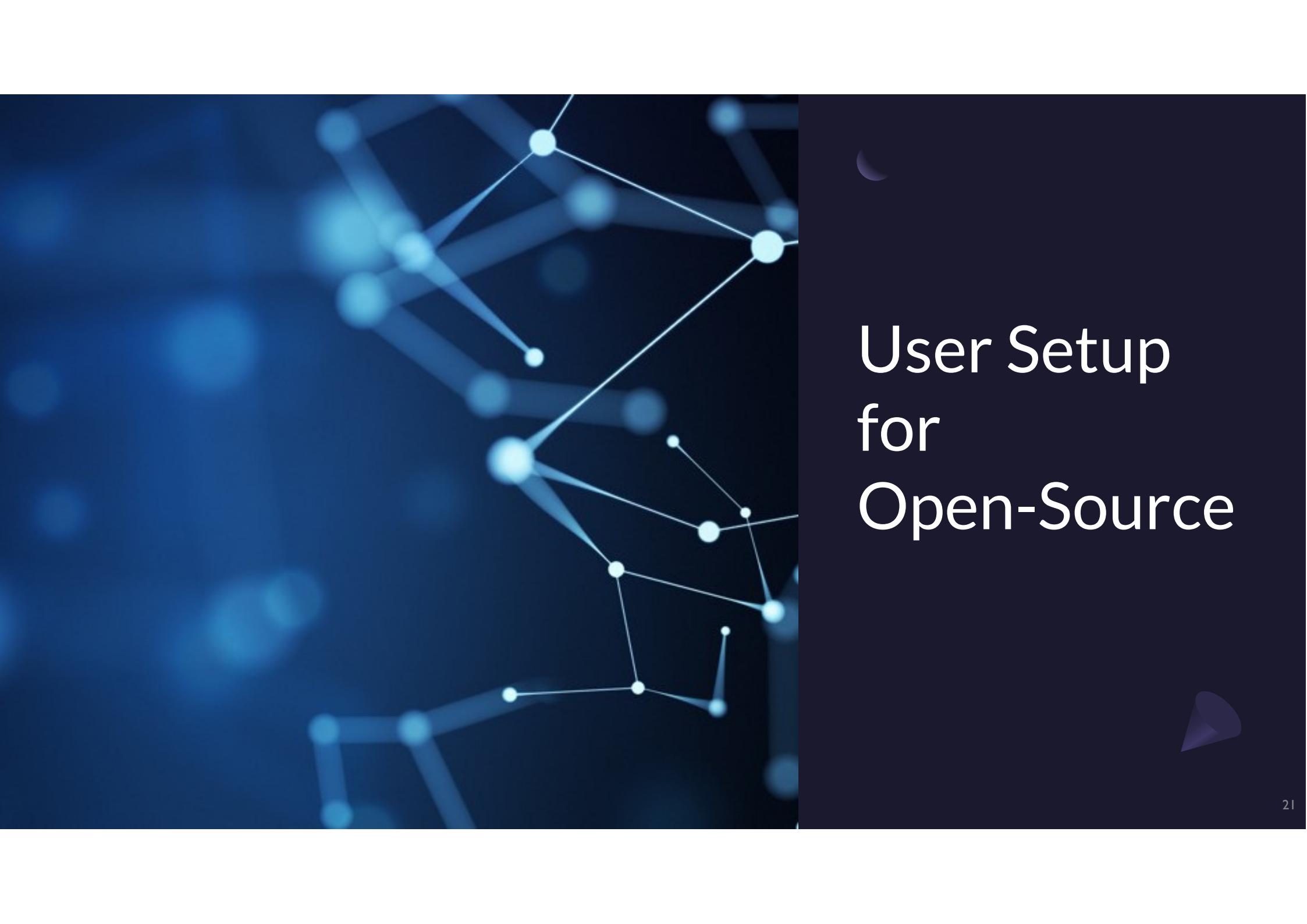
          MonMsg  Cpf0000 Exec(Goto Error)

          RtvSysVal QDate  &Date
          RtvSysVal QTime  &Time

/* Create naming convention for logging
   ChgVar    &Mbr ('Log_ || &Date )
   ChgVar    &FullName ('/QSYS.LIB/POWERWIRE.LIB/OSS_LOG.FILE/' || &Mbr || '.MBR')

/* Create Audit Log
   CrtPF    File(PowerWire/OSS_log) RcdLen(512) TEXT('OSS Audit Log ') MaxMbrs(*Nomax)
   MonMsg  (Cpf5813 Cpf7302) /* Already exists - dont care! */

/* Remove previous log
```

A dark blue background featuring a complex, glowing network graph composed of numerous small, semi-transparent blue spheres connected by thin white lines, creating a sense of depth and connectivity.

# User Setup for Open-Source

# Open-Source User Setup

- Ensure user has a home directory on their user profile
- Ensure that home directory exists
  - `mkdir /home/user_name`
- In the user home directory, ensure a profile exists
  - `touch $HOME/.profile`
  - `setccsid 1208 $HOME/.profile`
  - `echo 'PATH=/QOpenSys/pkgs/bin:$PATH' >> $HOME/.profile`
  - `echo 'export PATH' >> $HOME/.profile`
- After re-signing on, type
  - `which bash`

```
andy@GALATEA:~$ which bash  
/QOpenSys/pkgs/bin/bash ←  
andy@GALATEA:~$
```

# Accessing Open-Source Tools

- ➊ Do not use a **5250** session for open-source
- ➋ Use SSH - Secure SHell
- ➌ Why?
  - ➏ Its secure, all data is encrypted
  - ➏ It is all nice & fancy
  - ➏ Password free login
  - ➏ Free
- ➍ To start a SSH session to your IBM i
  - ➏ In a terminal, type **ssh user@your\_ibmi**
  - ➏ It will prompt you to enter a password for that system



A dark blue background featuring a complex, glowing network graph composed of numerous small, semi-transparent blue spheres connected by thin white lines, creating a sense of depth and connectivity.

# Shells on IBM i

# What is Pase for i?

- **P**ortable
- **A**pplication
- **S**olutions
- **E**nvironment



# PASE for i Shells

- What are shells, why should I use them?
- If you still use green screen for your shell access, look at all the benefits you can gain by moving away from 5250 shell access
- It's well worth the learning curve of using these shells!



# PASE for i Shells

- Korn → 5250 Access
- Bourne → SSH access
- C

# DATED!

# PASE Shell Types - What Then?



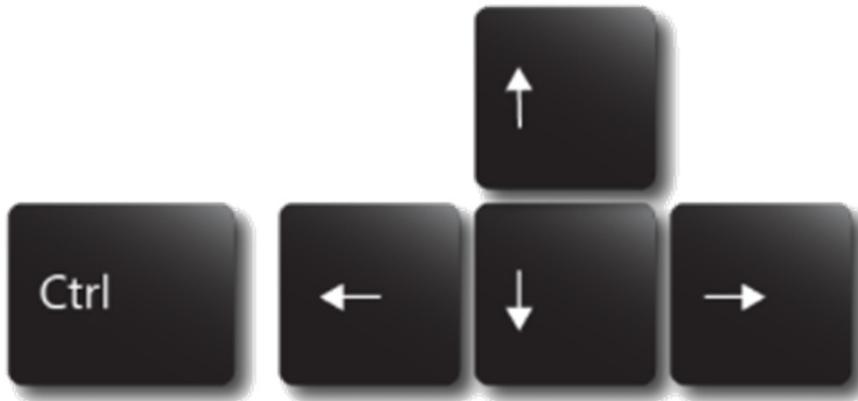
# Bash Benefits

- History
- Autocomplete
- Own Startup Script
- Customise
- And lots, lots more ...



# Bash History

- Use **arrow keys** for history
- Saves from previous sessions
- **Ctrl-r** to search history
- Environment variable **HISTSIZE** stores number of entries
- Stored in **bash\_history** file in home directory



## Export HISTSIZE=

# Bash Auto-complete

- Use **tab key** to autocomplete



# Some Useful BASH Commands

Description	Command	Example
Copy file	cp	cp Src_file Dest_file
Create a file	touch	touch readme.md
Create an alias	alias	alias dir='ls --color=auto --format=long'
Run success commands	&&	dir && cp x y && rm myfile
Run second command regardless of success of first one	;	Dir ; cp x y ; rm myfile
Run commands concurrently	&	touch a & touch b
Delete a file	rm	Rm -rf myfile.txt
Show used BASH commands	history	history   awk 'BEGIN {FS=[ \t]+ \\\"} {print \$3}'   sort   uniq -c   sort -nr   head
Show path(friendly)	echo	echo \$PATH   tr ":" "\n"

# IBM i BASH Commands

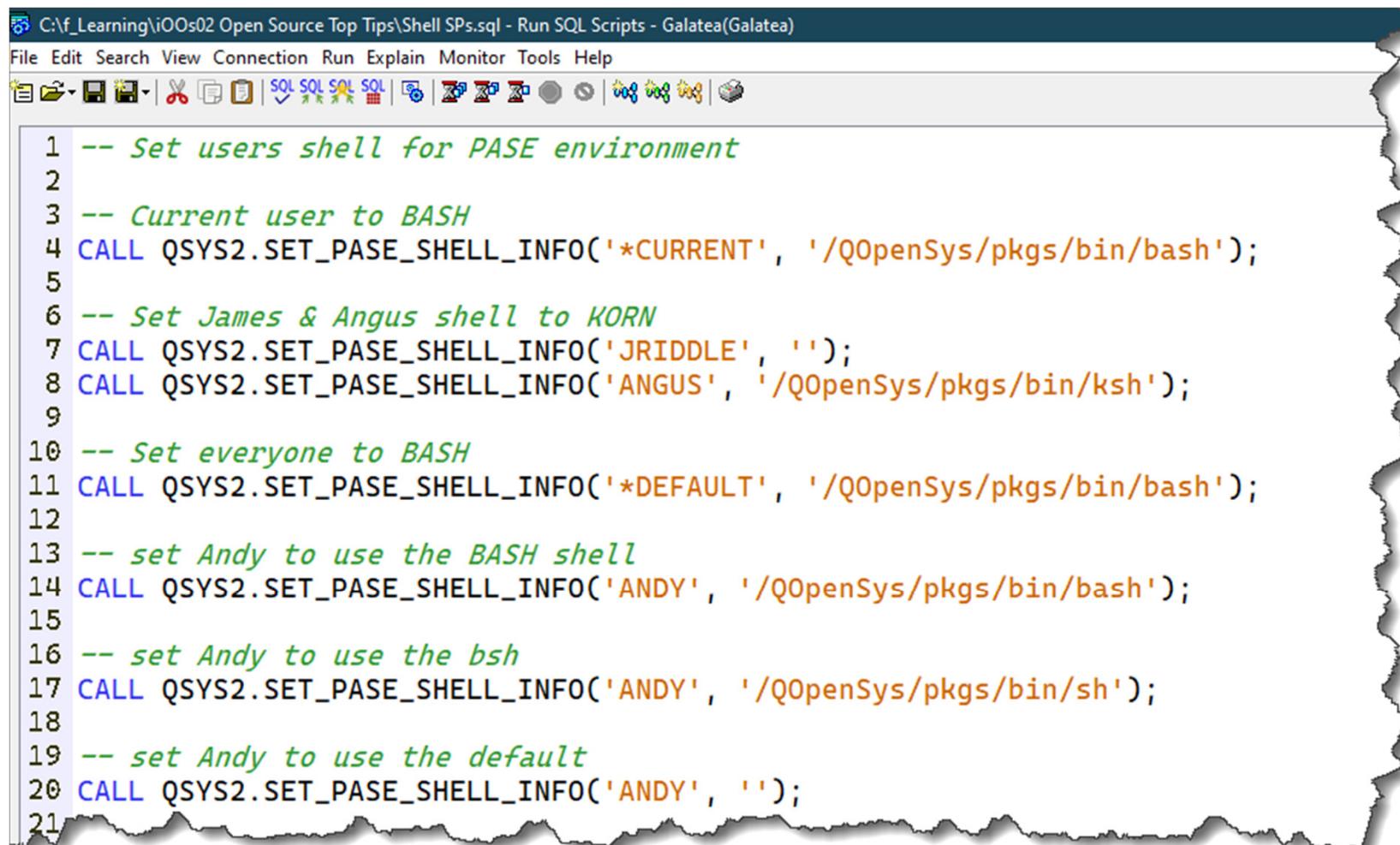
Description	Command	Example
Runs a command in a new job	system	system 'crtlib andy'
Runs a command in the current job	cl	cl 'crtlib andy'
Returns full job details of current job	getjobid	getjobid -v
Manipulate a library list	liblist	liblist -a myLibrary



# BASH Profile - .bashrc in ~ directory

```
SSH FS - galatea > home > andy > .bashrc
1 #-----
2 # Personnal Aliases
3 #-----
4 alias rm='rm -i'
5 alias cp='cp -i'
6 alias mv='mv -i'
7 alias l='ls -alF'
8 alias la='ls -A'
9 alias lc='ls -CF'
10
11 # what git branch we on?
12 parse_git_branch() {
13     git branch 2> /dev/null | sed -e '/^*/d' -e 's/* \(.*)/(\1)/'
14 }
15
16 # show git branch on prompt
17 export PS1="\u@\h \[\e[32m\]\w \[\e[91m\]\$(parse_git_branch)\[\e[00m\]$ "
18
19 # export PS1="My prompt $ > "
20
21
```

# Changing a User's Shell



The screenshot shows a SQL script editor window with the following details:

- Title bar: C:\f\_Learning\iOOS02 Open Source Top Tips\Shell SPs.sql - Run SQL Scripts - Galatea(Galatea)
- Menu bar: File Edit Search View Connection Run Explain Monitor Tools Help
- Toolbar: Includes icons for file operations (New, Open, Save, Print, Find, Copy, Paste) and connection management.
- Script content:

```
1 -- Set users shell for PASE environment
2
3 -- Current user to BASH
4 CALL QSYS2.SET_PASE_SHELL_INFO('*CURRENT', '/QOpenSys/pkg/bin/bash');
5
6 -- Set James & Angus shell to KORN
7 CALL QSYS2.SET_PASE_SHELL_INFO('JRIDDLE', '');
8 CALL QSYS2.SET_PASE_SHELL_INFO('ANGUS', '/QOpenSys/pkg/bin/ksh');
9
10 -- Set everyone to BASH
11 CALL QSYS2.SET_PASE_SHELL_INFO('*DEFAULT', '/QOpenSys/pkg/bin/bash');
12
13 -- set Andy to use the BASH shell
14 CALL QSYS2.SET_PASE_SHELL_INFO('ANDY', '/QOpenSys/pkg/bin/bash');
15
16 -- set Andy to use the bsh
17 CALL QSYS2.SET_PASE_SHELL_INFO('ANDY', '/QOpenSys/pkg/bin/sh');
18
19 -- set Andy to use the default
20 CALL QSYS2.SET_PASE_SHELL_INFO('ANDY', '');
21
```

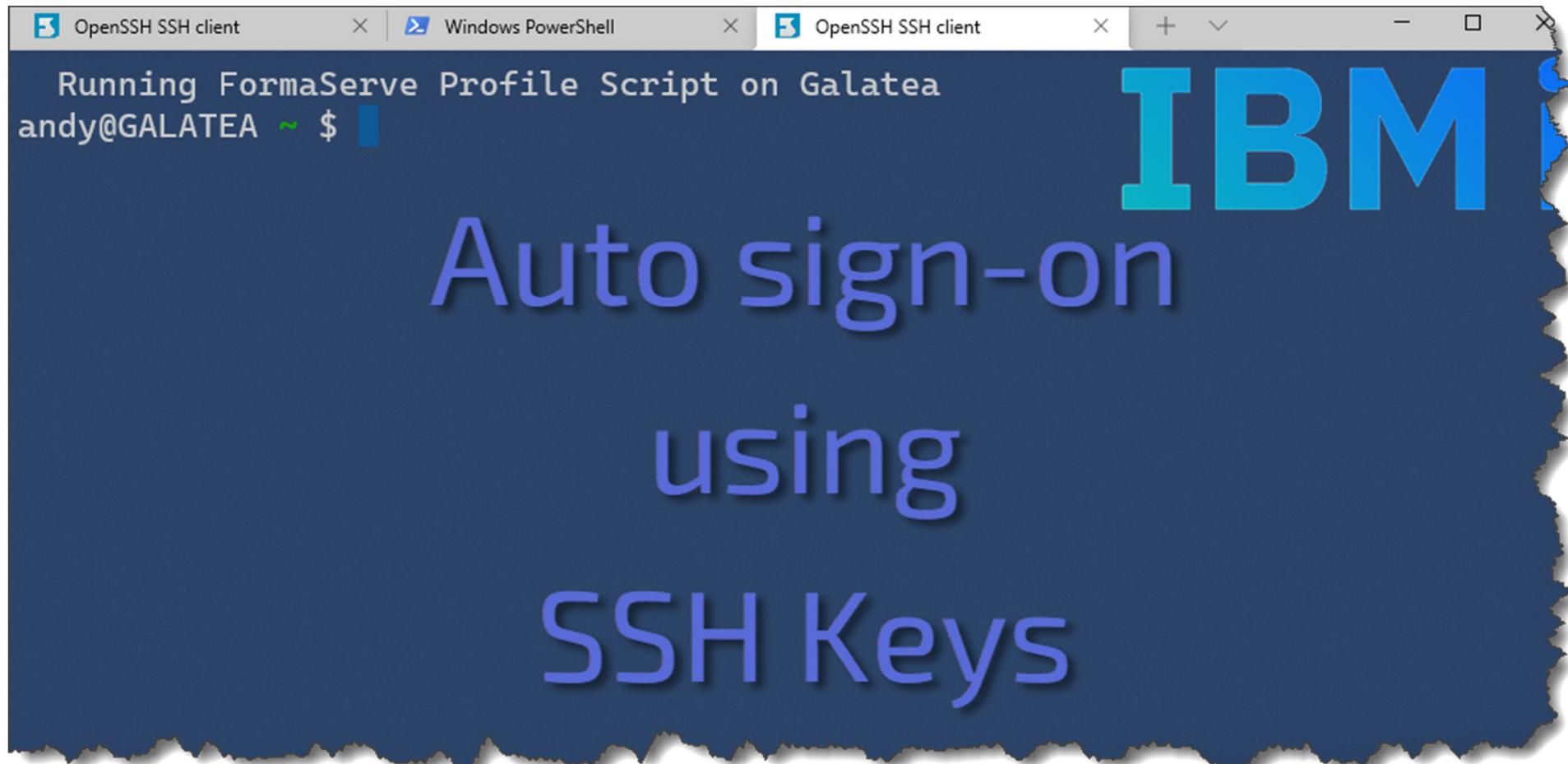
# Who is Using what Shell?

```
21  
22 -- what shells are being used by users  
23 Select Authorization_Name As User,  
24      Pase_Shell_Path As Shell  
25 From Qsys2.User_Info  
26 Order By User;  
27  
28
```

USER	SHELL
ANDY	-
ANDYYOUENS	-
ANGUS	/QOpenSys/pkgs/bin/ksh
ARE	-
CENTRAL	-
F_CONTACT	-
F_MTD	/QOpenSys/pkgs/bin/bash
F_MTD_DEV	-
F_MTD_X	-
F_USER	-
FORMASERVE	-
FRED	-

QSSHD	-
QSYS	/QOpenSys/pkgs/bin/bash
QSYSOPR	-
QTCM	-
OTC	-

# SSH Keys

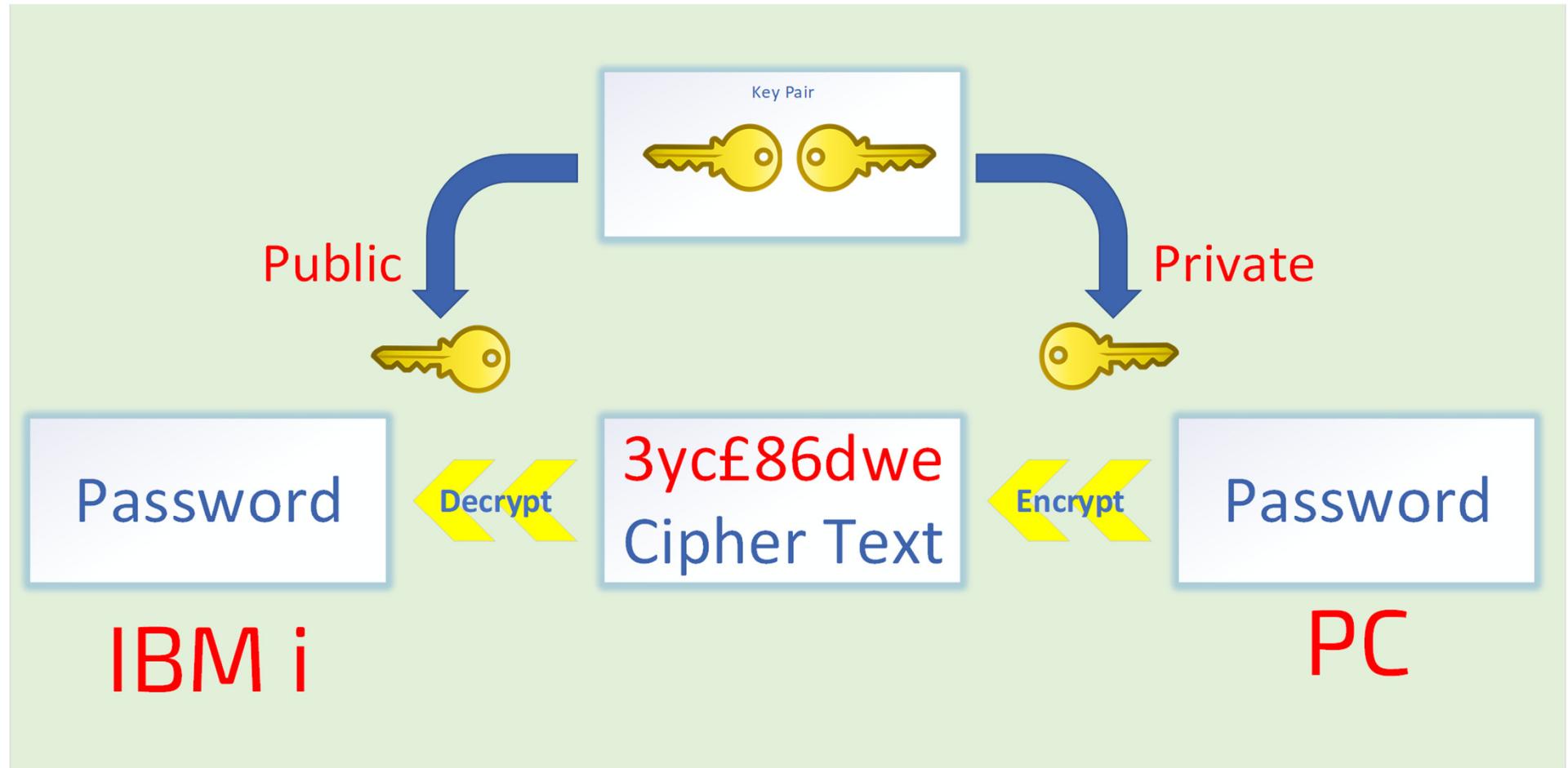


# How Does it Work?

- We have a pair of keys, a **private key** & a **public key**
- Each key pair is **unique**, the two keys work together
- If you have the private key, you can prove you have it without showing what it is
- It's like proving you know a password without having to show someone the password



# Key Authentication



# How to Generate Keys

- Use **ssh-keygen**
- We can use
  - OpenSSL feature of Windows
  - Git for Windows
  - Putty



# Send Public Key to IBM i



## Home .ssh Directory

A screenshot of a file explorer interface. The path is highlighted with a blue box: > Network > galatea > HOME > andy > .ssh. Inside the .ssh directory, there are several files listed:

Name	Date modified	Type	Size
authorized_keys	06/01/2021 15:58	File	1 KB
championtweets.deploy.pem	21/05/2021 17:08	PEM File	4 KB
id_rsa	20/03/2021 13:34	File	3 KB
id_rsa.pub	20/03/2021 13:34	Microsoft Publish...	1 KB
id_rsa_old.pub	14/01/2020 16:36	Microsoft Publish...	1 KB
id_rse@agh.pub	21/05/2021 17:08	Microsoft Publish...	1 KB
known_hosts	20/03/2021 13:40	File	1 KB

The "authorized\_keys" file is circled in green. The entire screenshot has a decorative torn paper effect around the edges. A large, stylized "IBM i" logo is visible on the right side of the image.

# Not Working?

- Home Directory
  - Are you the owner? - ls -ld /home/Andy/  
● **chown andy /home/andy**
  - Check permissions on home directory - drwxr-sr-x  
● **chmod 755 /home/andy/**
- .ssh Directory
  - Are you the owner of the .ssh directory? - ls -ld /home/Andy/.ssh  
● **chown andy /home/andy/.ssh**
  - Check authority for -rw - drwx-S--3  
● **chmod 700 /home/andy/.ssh/**
- Authorized\_keys
  - Check authority for -rw  
● **chmod 600 /home/andy/.ssh/authorized\_keys**

# BASH Programming - 10 Videos



How to write BASH shell scripts on the IBM i - Customising BASH



FormaServe  
524 subscribers

Analytics

Edit video

12

Share

Download

Clip

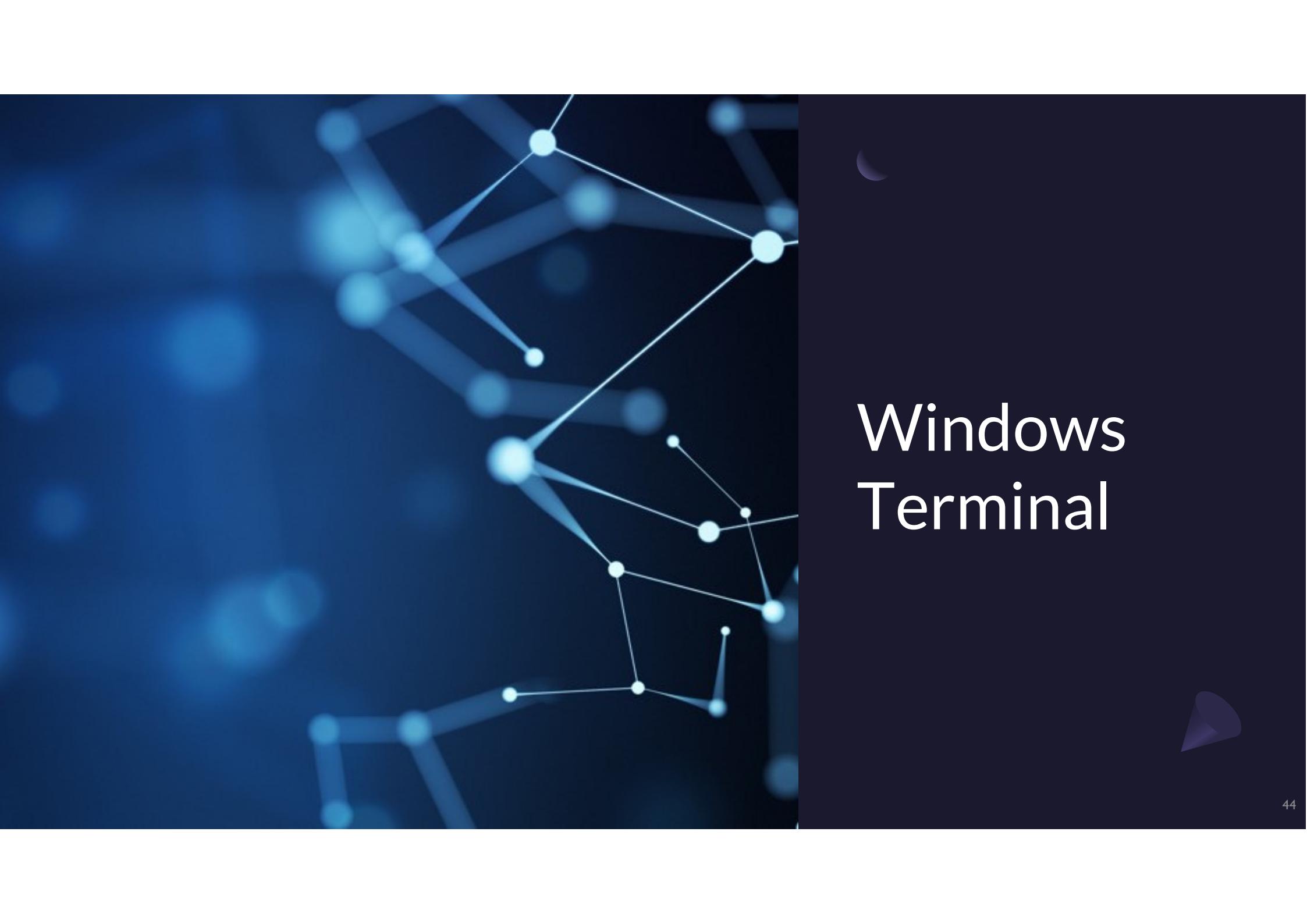
Save

...



The image shows a list of 10 video thumbnails for "BASH on IBM i" by FormaServe. The thumbnails are arranged vertically, each showing a small video frame, the title, duration, and the "FormaServe" channel name. The titles include "How to Set Up a SSH Banner on IBM i: A Professional Guide", "How to write BASH shell scripts on the IBM i - Running...", "Customise Bash", "How to write BASH shell scripts on the IBM i - Creating...", "How to write BASH shell scripts on the IBM i - ...", "Processing Data", "How to write BASH shell scripts on the IBM i - Using...", "How to write BASH shell scripts on the IBM i - Using...", "How to write BASH shell scripts on the IBM i - ...", and "Harnessing Shells on the IBM i for Professional Results".

Video Number	Title	Duration	Channel
1	How to Set Up a SSH Banner on IBM i: A Professional Guide	8:36	FormaServe
2	How to write BASH shell scripts on the IBM i - Running...	14:01	FormaServe
3	Customise Bash	15:36	FormaServe
4	How to write BASH shell scripts on the IBM i - Creating...	15:21	FormaServe
5	How to write BASH shell scripts on the IBM i - ...	24:55	FormaServe
6	Processing Data	12:23	FormaServe
7	How to write BASH shell scripts on the IBM i - Using...	14:14	FormaServe
8	How to write BASH shell scripts on the IBM i - ...	12:34	FormaServe
9	Harnessing Shells on the IBM i for Professional Results	11:47	FormaServe

A dark blue background featuring a complex, glowing network graph composed of numerous small, semi-transparent blue spheres connected by thin white lines, creating a sense of depth and connectivity.

# Windows Terminal

# Windows Terminal

- Launched 2019
- Open-Source



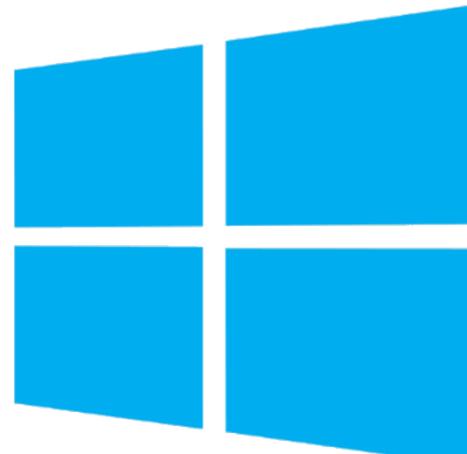
# Windows 11

- GitHub Repo  
<https://github.com/Microsoft/Terminal>



# Windows Terminal Features

- UTF8 & UTF16 (inc emojis) ⚡ ⚡ ⚡ ⚡ ⚡ ⚡
- Colour transparency effects
- Background images
- Themes
- Full screen mode
- Split panes
- Mouse input
- Customisable key bindings



# Windows Terminal Settings

- Settings offer a great deal of control over each shell's appearance
- Different profiles for
  - PowerShell
  - Command Prompt
  - Azure connections
  - Ubuntu terminal (WSL)
  - SSH connections
  - Git Bash sessions
  - Raspberry Pi sessions
  - All fully customisable



# Cascadia Code

- A programmer's font!
- Included with Windows Terminal
- Includes font ligatures

**Cascadia Code**  
*and Italic  
& Cursive*

→ \* \*\* ≠ + · = ≥

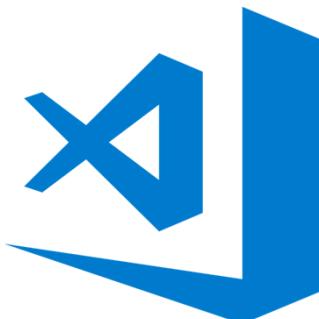
A dark blue background featuring a glowing, semi-transparent network graph composed of white lines and circular nodes. The graph is more dense and sharp in the lower right quadrant, where it forms the title text, while fading into a blurred, glowing effect towards the top left.

# Integrated Language Environments

# IDE's

- NetBeans
- Eclipse RDi\*
- Visual Studio\*
- Visual Studio Code
- Notepad ++
- 5250 EDTF

\* Chargeable

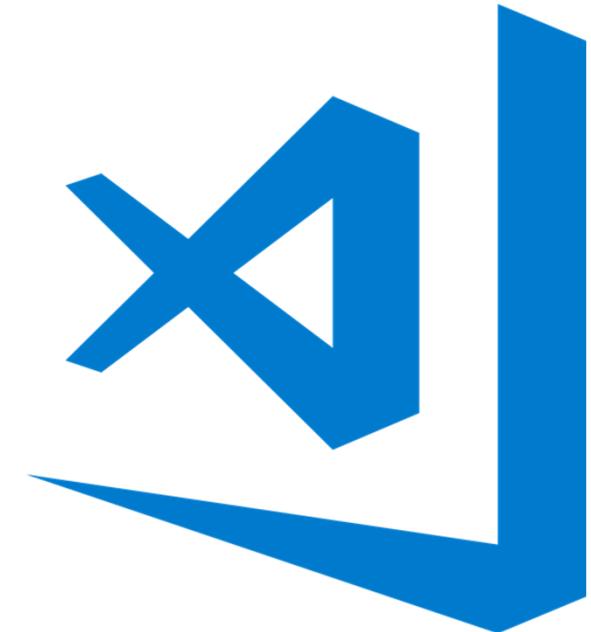


- Others

- Sublime Text
- Cloud 9
- WebStorm
- Komodo
- Koding
- Etc. Etc .. . .

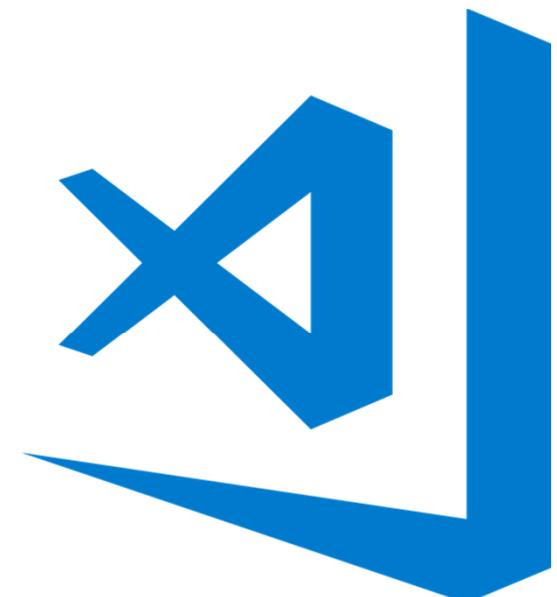
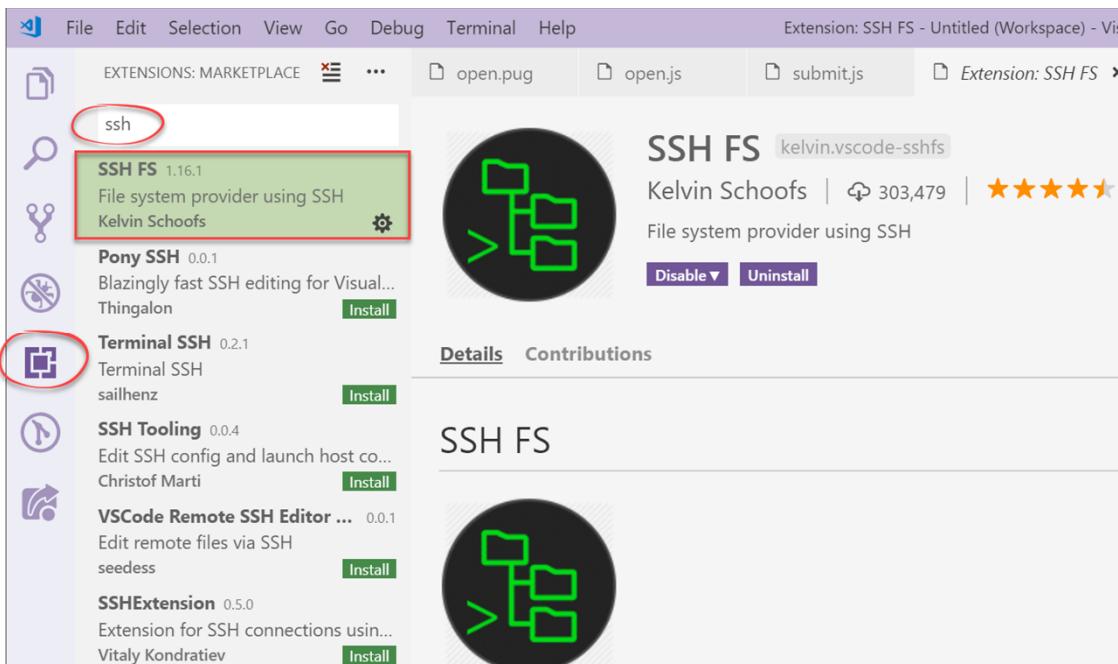
# Visual Studio Code

- Need to edit files in the IFS?
- Only one choice - Visual Studio Code
- Runs on macOS, Linux & Windows
- Extensions make VS Code!
- Its Open-Source!
- Free for private & commercial use
- Download at <https://code.visualstudio.com/download>



# VS Code Extensions

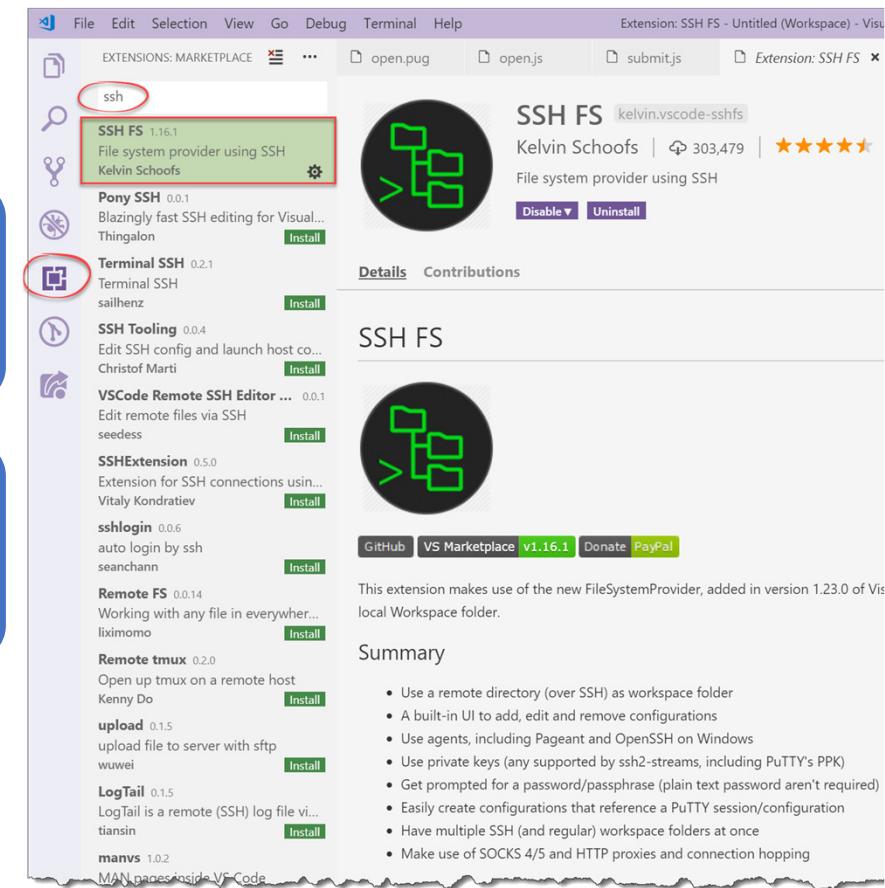
- Increase the power of VS Code through Extensions
- Out of the box features are just the start
- Let's you add languages, debuggers & tools to your installation to support your development workflow



# IBM i Connection

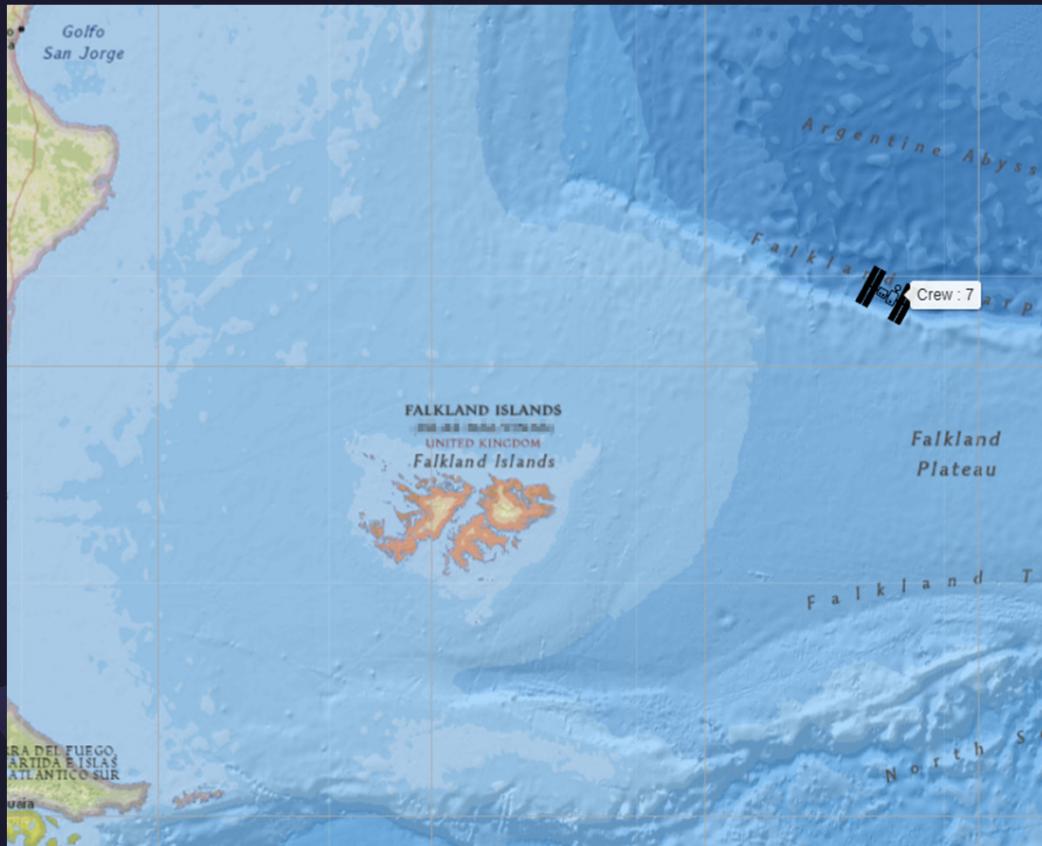
Use extension SSH FS

Ensure \*SSHD server running



# A Couple of Extras

- International Space Station



- High & Low Tide Times



# Thank You!

## Andy Youens

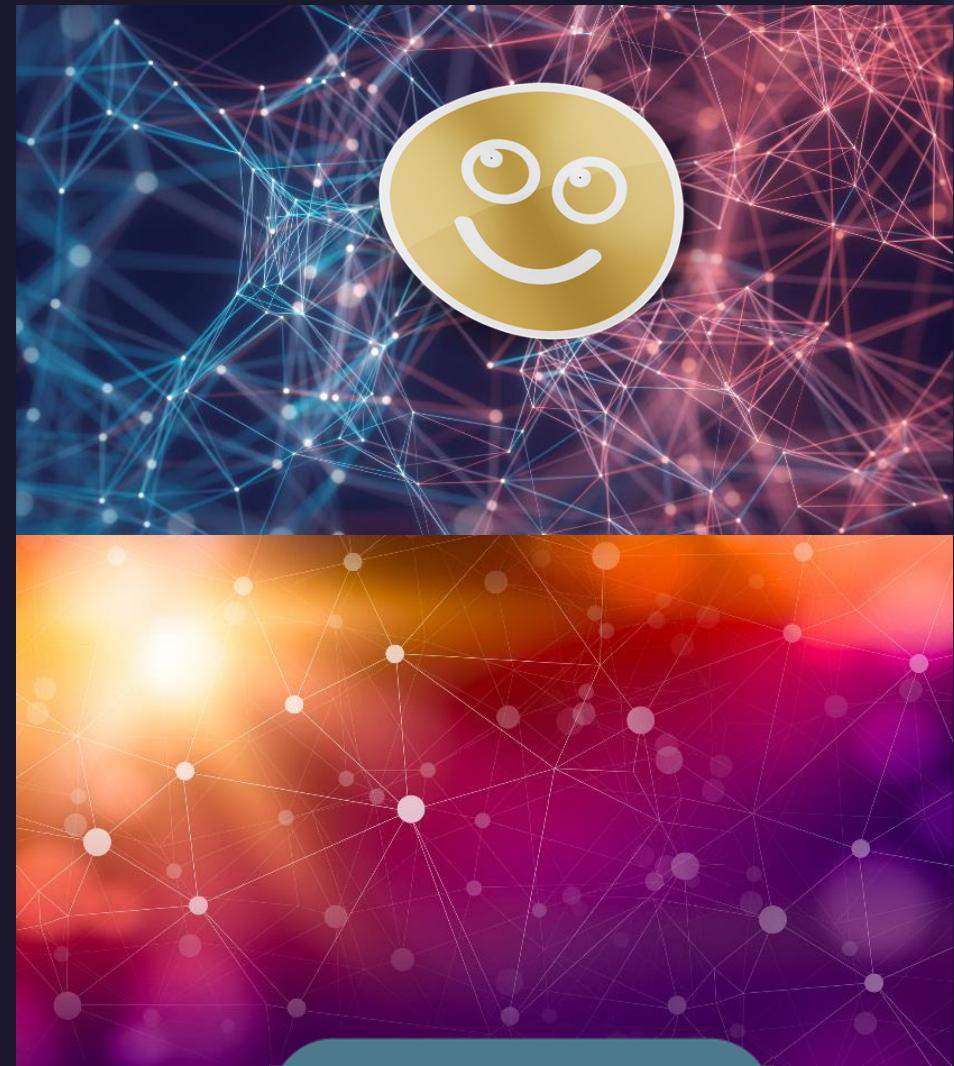
[Andy@FormaServe.co.uk](mailto:Andy@FormaServe.co.uk)

[www.formaserve.co.uk](http://www.formaserve.co.uk)

[learning.formaserve.co.uk](http://learning.formaserve.co.uk)

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 Buy Me a Coffee

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