

# Open-Source Software on IBM i

## Your Questions Answered

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November 1<sup>st</sup>, 2019  
COMMON Norge



# Outline

- Introduction
- What is open-source software?
- Why use open-source software on IBM i?
- What open-source software is available on IBM i?
- How can I get open-source software?
- How do I use open-source software?
- Conclusions

# Introduction

# Open-source software on IBM i

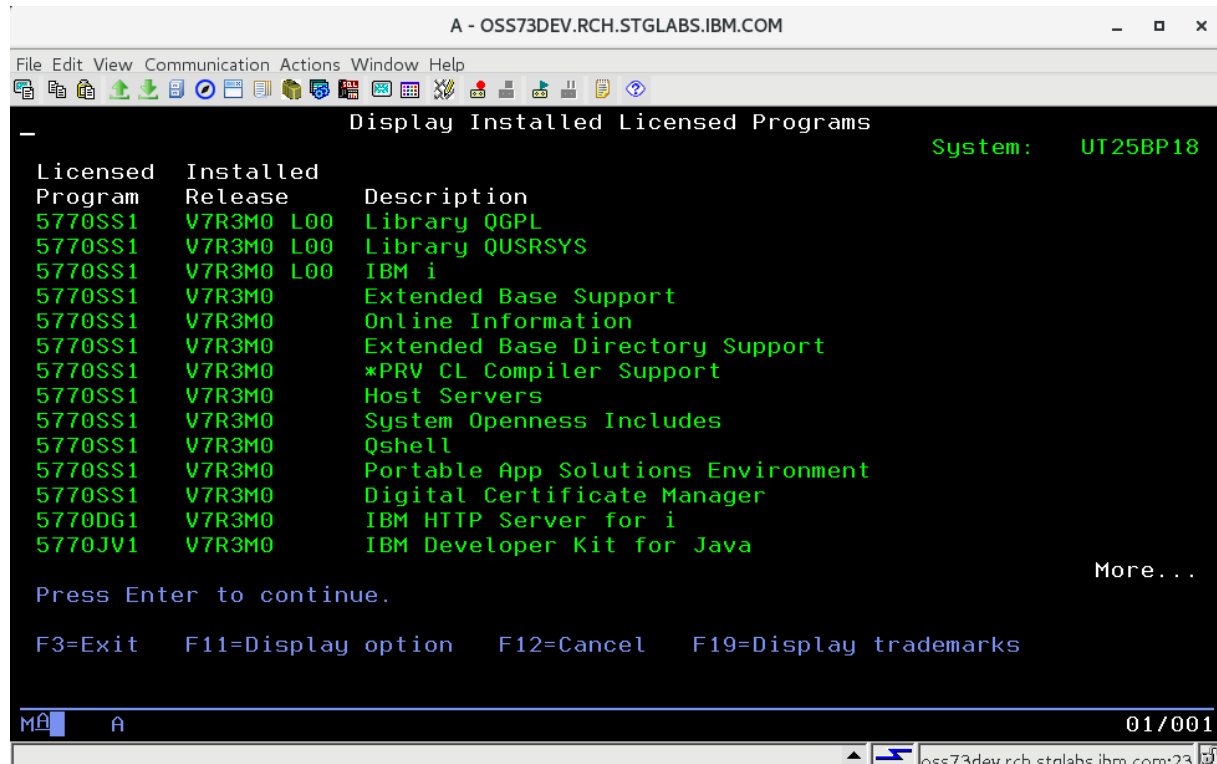
- Open-source software often draws some confusion from IBM i developers who are used to developing RPG, CL, and SQL programs in ILE using 5250
- Most open-source software is called through a shell (bash, QSH, etc.), which can feel different from calling software with CL commands
- The vast majority of open-source software on IBM i is ported and maintained by IBMers
- New open-source software is being delivered all the time

# PASE

- Unlike IBM i-native programs, open-source software on the system runs in the Portable Application Solutions Environment (PASE), an AIX-like environment that runs beside ILE
  - PASE is a Unix environment, will be comfortable to Unix and Linux developers
- PASE needs to be installed on IBM i before you can use it
  - Licensed Program: 5770-SS1
  - I've never seen a system without PASE on it, but they may be out there

# 5250 v. bash terminal

- Most open-source software is not called with 5250, so this is a paradigm you should get comfortable with



A - OSS73DEV.RCH.STGLABS.IBM.COM

File Edit View Communication Actions Window Help

Display Installed Licensed Programs System: UT25BP18

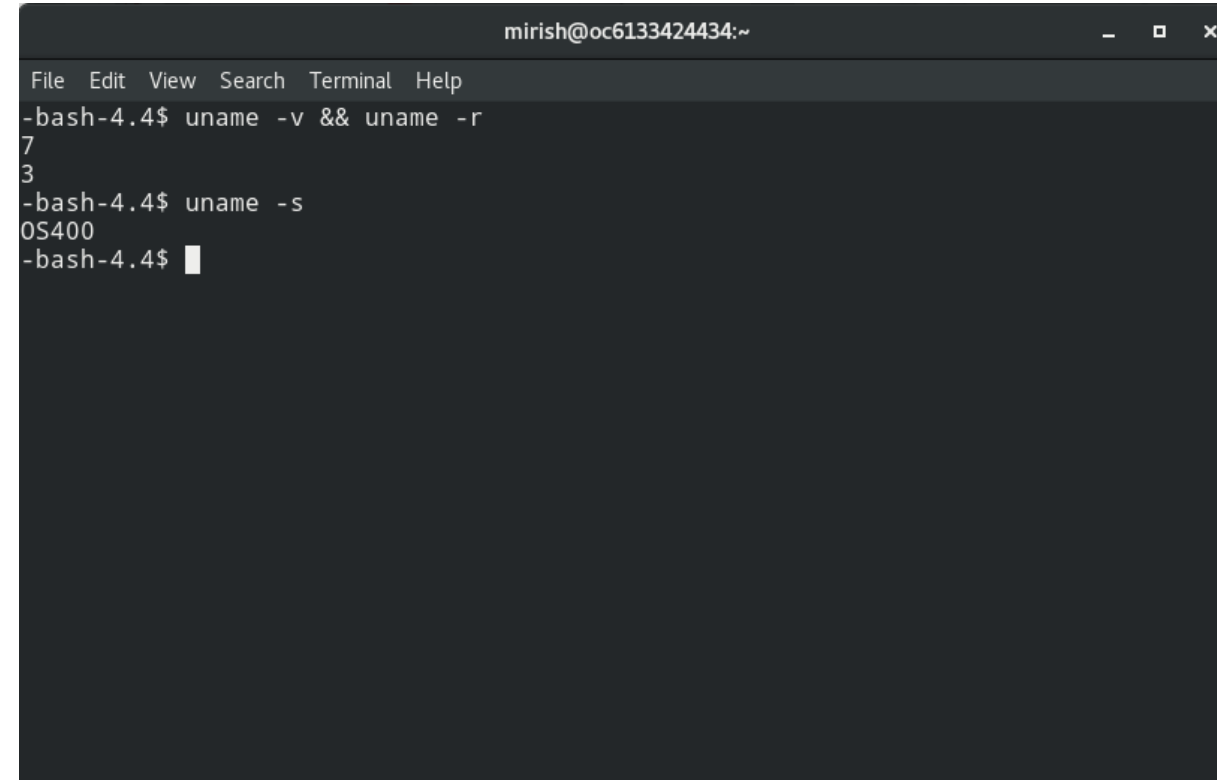
Licensed Program	Installed Release	Description
5770SS1	V7R3M0 L00	Library QGPL
5770SS1	V7R3M0 L00	Library QUSRSYS
5770SS1	V7R3M0 L00	IBM i
5770SS1	V7R3M0	Extended Base Support
5770SS1	V7R3M0	Online Information
5770SS1	V7R3M0	Extended Base Directory Support
5770SS1	V7R3M0	*PRV CL Compiler Support
5770SS1	V7R3M0	Host Servers
5770SS1	V7R3M0	System Openness Includes
5770SS1	V7R3M0	Qshell
5770SS1	V7R3M0	Portable App Solutions Environment
5770SS1	V7R3M0	Digital Certificate Manager
5770DG1	V7R3M0	IBM HTTP Server for i
5770JV1	V7R3M0	IBM Developer Kit for Java

More...

Press Enter to continue.

F3=Exit F11=Display option F12=Cancel F19=Display trademarks

MA A 01/001



mirish@oc6133424434:~

File Edit View Search Terminal Help

```
-bash-4.4$ uname -v && uname -r
7
3
-bash-4.4$ uname -s
OS400
-bash-4.4$
```

# **What is open-source software?**

# What is open-source software?

- Open-source software is software where the source code is published for everyone to see and use
- Allows developers to build binaries on their own (sometimes unique) systems instead of relying on pre-built binaries
- Open-source software has no common theme or use-case, the only thing it has in common is that its source code is open
- Open-source software is often **published under a license** that dictates what you can and cannot do with the code



# Popular open-source software



# What is open-source software on IBM i?

- On IBM i, the Open-Source Software Team takes popular open-source software and ensures that it works on IBM i
  - Can only be done because we can see the source code and figure out how to patch it to work with PASE/AIX and IBM i
- 99% of open-source software on IBM i runs in PASE, but there are some packages (e.g. curl) that run in ILE.
- All open-source software that runs in PASE is delivered through **yum**

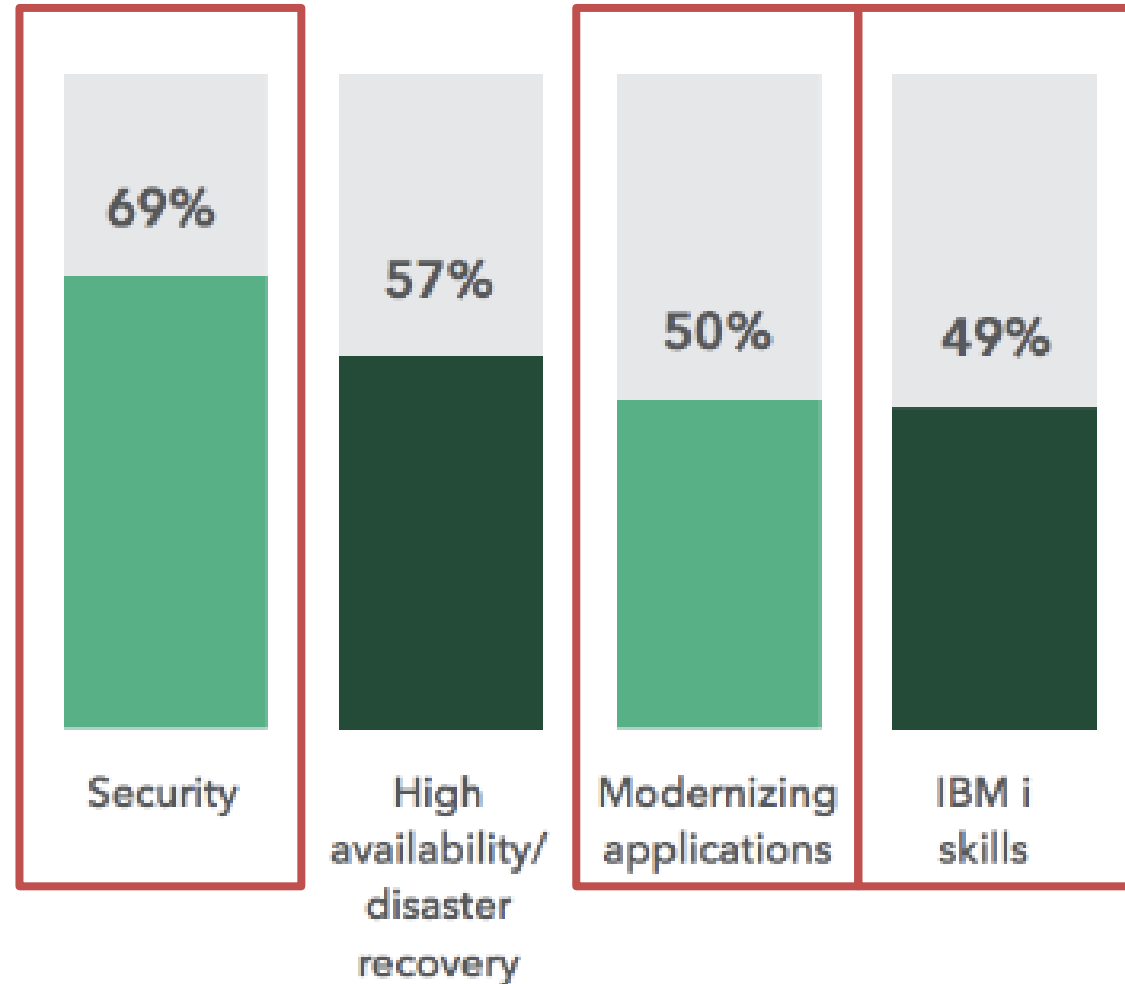
# **Why use open-source software?**

# IBM i Marketplace Survey

What are your top concerns as you plan your IT environment?



# IBM i Marketplace Survey



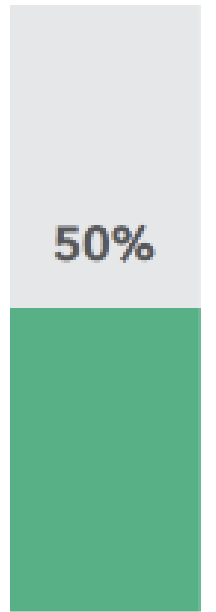
# Open-source software and security



Security

- Open-source software isn't less secure than proprietary software, especially when widely used
- Many large open-source projects have bug bounties that find vulnerabilities by white-hats
- Open-source software often fixes known vulnerabilities much faster than closed-source software
- More eyes on code generally means higher quality code

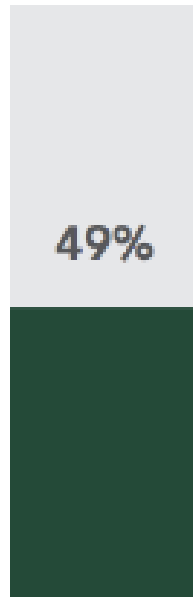
# Open-source software and modernization



Modernizing  
applications

- Open-source software adds features much quicker than proprietary software
  - As new technology is created, developers often want to integrate it with existing popular open-source projects
- There are open-source projects for nearly everything you need to do in your business
- The standard for new technology is to make it open source, and find another method of profiting off of it

# Open-source software and IBM i skills



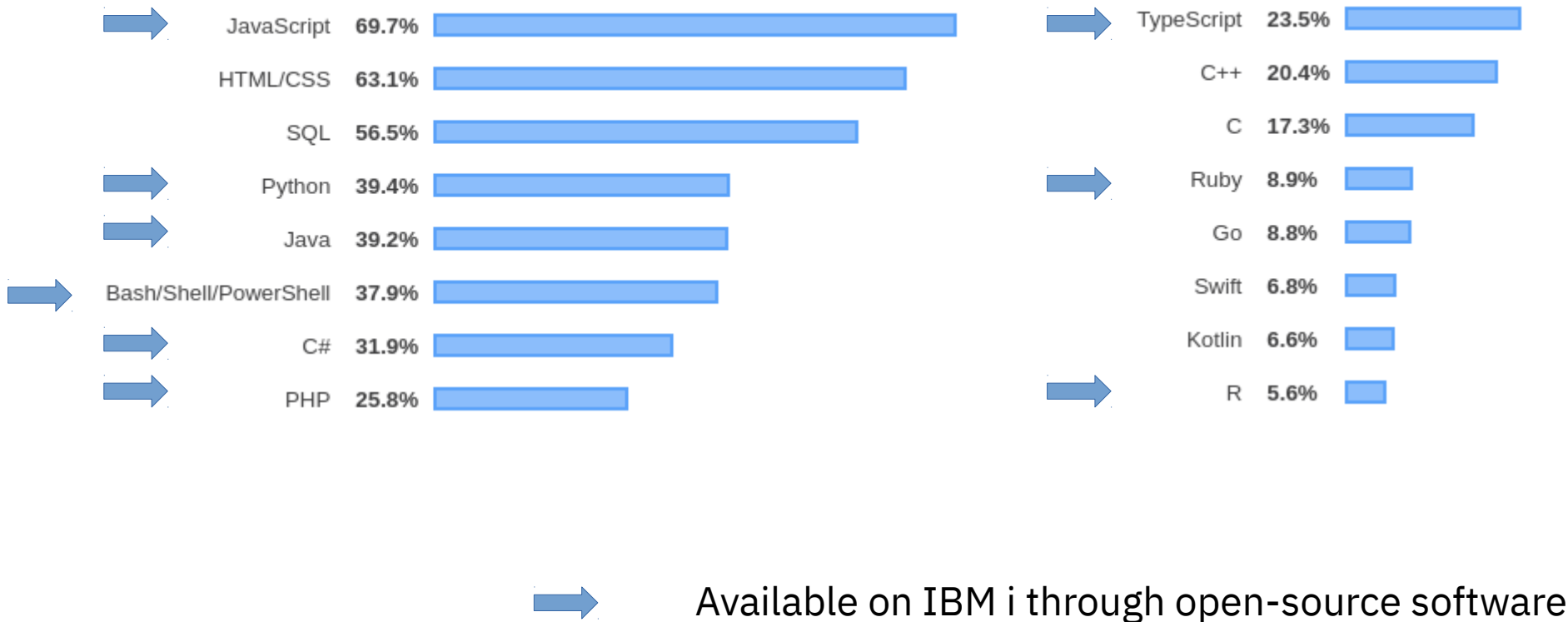
IBM i  
skills

- Many of the open-source packages on IBM i are known by a large number of developers
- Many open-source packages have the ability to call Db2 for i and ILE programs
  - Developers never need to work with 5250 or know they are on IBM i
  - Developers can be introduced to the “flavor” of IBM i slowly



# Open-source software and IBM i skills


- Stack Overflow 2019 Developer Survey “Most Popular Technologies”:




# IBM i open-source software success stories



Model : BRAINBUILDER mono-move



Choose the colour of your fabric. 3/3



salerno C0005

Selling price of your configuration:  
4,905 USD

Previous Next

SIZE OPTIONS COVERING ARMRESTS BASE Your model BRAINBUILDER

This illustrated version  
in entry leather: 5,492 USD  
in entry fabric: 4,905 USD

# IBM i open-source software success stories



A screenshot of a web browser displaying the DEKNUDT website. The browser's address bar shows the URL 'https://www.deknuframes.be/en/catalog/product/s45yd3-/photo-frame-bronze-wood'. The website has a navigation menu with categories like FRAMES, WALL DECORATIONS, GIFTS AND GADGETS, MOMENTS IN LIFE, ALBUMS AND PHOTO BOXES, ACCESSORIES, and PROJECTS. The main content area features a large image of a bronze wood photo frame with a couple's photo inside. To the right of the image, the product name 'photo frame bronze wood S45YD3' is displayed, followed by a description: 'A classic wooden photo frame in a bronze colour, including quality glass both with a plain and non-glare side, which can be switched easily. The perfect frame to create a rustic and warm atmosphere.' Below the description is an orange button labeled 'SHOW SIZES AND PRICES'. Further down, there is a color selection section with a 'colour bronze' option and a 'another colour?' section with five color swatches. To the right of the color selection is a technical drawing of the frame showing dimensions: 1,5, 45Y, and 2,5. Below the technical drawing is a wooden frame profile. At the bottom of the product page, there are links for 'shipping information' and 'download'. A small grid of six thumbnail images is located below the main product image, showing different frame styles and sizes.

# IBM i open-source software success stories

“This e-commerce platform is another example of how we are using technology to generate competitive advantage. And what’s really interesting is that this up-to-date, **open source solution runs side-by-side and fully integrated with trusted core business systems originally coded in the 1970s.** In all the years we’ve used IBM i and the Power Systems platform, we’ve never experienced any issues around stability or security, which contributes to the low total cost of ownership—for us, IBM i is a phenomenally stable platform for business that is also open to all kinds of future possibility.”

# IBM i open-source software success stories

- Many IBM i success stories with open-source software:
  - <https://www.ibm.com/case-studies/cras-systems-open-source>
  - <https://www.ibm.com/case-studies/fibrocity-systems-furniture-design>
  - <https://cms.ibm.com/case-studies/winsol-systems-hardware-manufacturing-digitization>
  - <https://www.ibm.com/case-studies/kube-pak-systems-gardening-wholesale>
  - <https://www.ibm.com/case-studies/immo-bonehill-systems-hardware-website-compliance>
  - <https://www.ibm.com/case-studies/ORIS>

**What open-source software is available on IBM i?**

# Open-source software survey

- There are over 300 individual packages of open-source software delivered directly to IBM i
- Here is a really fast overview of some of what is offered...

# IBM partnership: Zend PHP

- Zend Server
  - Preloaded with IBM i 6.1 and 7.1
  - One year of Silver Support from Zend
- Zend Studio for i: Eclipse-based development environment
- Zend DBi: MySQL implementation for IBM i
- Request for Enhancement (RFE) for a PHP RPM has been accepted, **expect to see it soon**





# IBM i PHP users



# IBM Partnership: POWER Ruby

- Freely available and commercially supported
- Includes supporting infrastructure for web applications on IBM i
- Available for download at [www.powerruby.com](http://www.powerruby.com)
- Includes native Db2 for i database driver
- Integrates with XMLSERVICE for access to IBM i programs and objects



# Python

- Powerful general-purpose language
- Interpreted
- Why Python?
  - Easy to use (designed to be fun!)
  - The CL language of the modern programmer
  - Easy for IBM i programmers to learn
- 200,000+ third-party packages available on [pypi.org](https://pypi.org)



# Machine Learning Software

- Python packages that allow you to do machine learning on IBM i
  - scikit-learn
  - pytorch
  - jupyter-notebooks
















# R

- Very popular language used for
  - Data analysis
  - Statistical computing
  - Data mining
  - Big data



## Language Ranking: IEEE Spectrum

Rank	Language	Type	Score
1	Python	  	100.0
2	Java	  	96.3
3	C	  	94.4
4	C++	  	87.5
5	R		81.5

2019 IEEE Spectrum rankings showing the most popular and influential development languages

# Node.js

- JavaScript runtime
- Server-side applications with JavaScript
- Uses Google's V8 engine
- Why Node.js?
  - JavaScript on the front end and the back end
  - Highly performant (much faster than Java for I/O)
  - 1,000,000+ third-party packages available on [npmjs.com](https://www.npmjs.com)



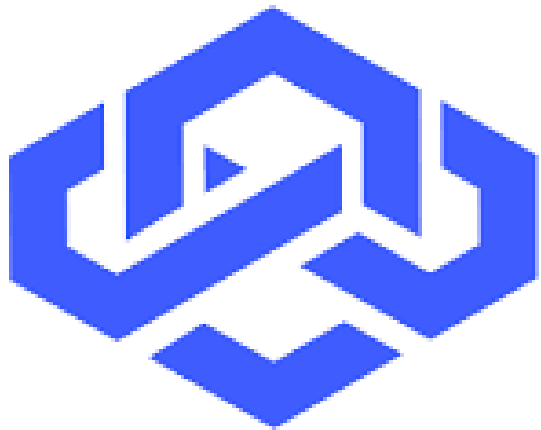
# Node.js connectivity libraries

- idb-connector
  - Db2 for i database connector
- idb-pconnector
  - Db2 for i connector with pooling and Promises
- odbc
  - ODBC connector (maintained by me!)
- itoolkit
  - Connecting with XMLSERVICE to call PGMs and more



# LoopBack

- Framework for quickly creating REST API endpoints
- Can create models and propagate them to Db2 for i, or create models from current Db2 for i tables and schemata



# LoopBack



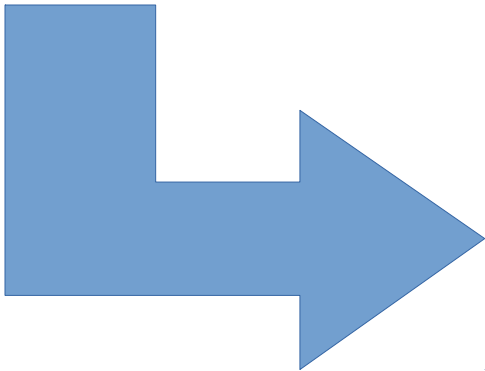
# LoopBack

Table	Columns	Key Constraints	Foreign Key Constraints	Check Constraints	Materialized Query	Partitioning
Column Name	System Name	Data Type	Length	Nullable	Generated Value	Default Value
"isbn"	ISBN_00001	INTEGER		Yes		No default
"id"	ID_00001	INTEGER		No	Identity	
"personId"	PERSO00001	INTEGER		Yes		No default
"title"	TITLE00001	VARCHAR	128	Yes		No default

Add...  
Remove  
Definition...  
Move Up  
Move Down  
Browse...

Show SQL

OK Cancel



## book

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

PATCH	/books	Patch an existing model instance or insert a new one into the data source.
GET	/books	Find all instances of the model matched by filter from the data source.
PUT	/books	Replace an existing model instance or insert a new one into the data source.
POST	/books	Create a new instance of the model and persist it into the data source.
PATCH	/books/{id}	Patch attributes for a model instance and persist it into the data source.
GET	/books/{id}	Find a model instance by {{id}} from the data source.
HEAD	/books/{id}	Check whether a model instance exists in the data source.
PUT	/books/{id}	Replace attributes for a model instance and persist it into the data source.
DELETE	/books/{id}	Delete a model instance by {{id}} from the data source.
GET	/books/{id}/exists	Check whether a model instance exists in the data source.
GET	/books/{id}/person	Fetches belongsTo relation person.
POST	/books/{id}/replace	Replace attributes for a model instance and persist it into the data source.
GET	/books/change-stream	Create a change stream.
POST	/books/change-stream	Create a change stream.
GET	/books/count	Count instances of the model matched by where from the data source.
GET	/books/findOne	Find first instance of the model matched by filter from the data source.
POST	/books/replaceOrCreate	Replace an existing model instance or insert a new one into the data source.
POST	/books/update	Update instances of the model matched by {{where}} from the data source.
POST	/books/upsertWithWhere	Update an existing model instance or insert a new one into the data source based on the where criteria.

# LoopBack

```
Enter an empty property name when done.
? Property name: Name
? Property type: string
? Required? Yes
? Default value[leave blank for none]:
```

```
Let's add another employee property.
Enter an empty property name when done.
? Property name: EmployeeID
? Property type: number
? Required? Yes
? Default value[leave blank for none]:
```

```
Let's add another employee property.
Enter an empty property name when done.
? Property name: StartDate
? Property type: date
? Required? Yes
? Default value[leave blank for none]:
```

```
Let's add another employee property.
Enter an empty property name when done.
? Property name:
[markirish@oc6133424434 loopback-test]$
```



## employee

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#)

PATCH	/Employees	Patch an existing model instance or insert a new one into the data source.
GET	/Employees	Find all instances of the model matched by filter from the data source.
PUT	/Employees	Replace an existing model instance or insert a new one into the data source.
POST	/Employees	Create a new instance of the model and persist it into the data source.
PATCH	/Employees/{id}	Patch attributes for a model instance and persist it into the data source.
GET	/Employees/{id}	Find a model instance by {{id}} from the data source.
HEAD	/Employees/{id}	Check whether a model instance exists in the data source.
PUT	/Employees/{id}	Replace attributes for a model instance and persist it into the data source.
DELETE	/Employees/{id}	Delete a model instance by {{id}} from the data source.
GET	/Employees/{id}/exists	Check whether a model instance exists in the data source.
POST	/Employees/{id}/replace	Replace attributes for a model instance and persist it into the data source.
GET	/Employees/change-stream	Create a change stream.
POST	/Employees/change-stream	Create a change stream.
GET	/Employees/count	Count instances of the model matched by where from the data source.
GET	/Employees/findOne	Find first instance of the model matched by filter from the data source.
POST	/Employees/replaceOrCreate	Replace an existing model instance or insert a new one into the data source.
POST	/Employees/update	Update instances of the model matched by {{where}} from the data source.
POST	/Employees/upsertWithWhere	Update an existing model instance or insert a new one into the data source based on the where criteria.

# LoopBack

Response Content Type application/json ▼

### Parameters

Parameter	Value	Description	Parameter Type	Data Type
id	<input type="text" value="4"/>	Model id	path	string
filter	<input type="text"/>	Filter defining fields and include - must be a JSON-encoded string ({'something':'value'})	query	string

Try it out! [Hide Response](#)

### Curl

```
curl -X GET --header 'Accept: application/json' 'http://0.0.0.0:3000/api/books/4'
```

### Request URL

```
http://0.0.0.0:3000/api/books/4
```

### Response Body

```
{
  "title": "Journey to the Center of the Processor",
  "isbn": 1726308311,
  "id": 4,
  "personId": 0
}
```

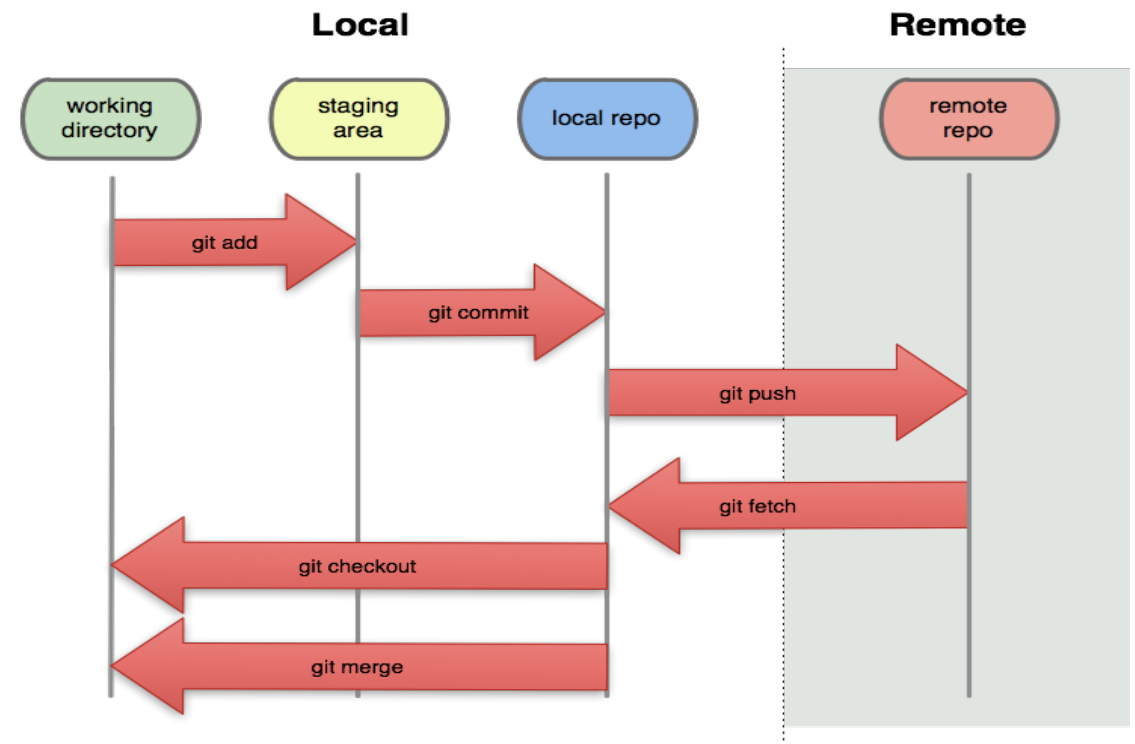
### Response Code

# Git

- Open-source distributed source control system
- Source control for virtually any language
- Industry standard for source control



# git



# Open-source software tools available

- File system can be accessed with
  - SMB
  - sftp/scp
  - sshfs
  - ftp/ftps
  - IBM i-specific access tools
- Tools for editing code
  - Visual Studio Code
  - Notepad++
  - vi/emacs/joe
  - Rational Developer for IBM i

# Open-source software tools available

```

PuDB 2017.1 - ? :help n:next s:step into b:breakpoint !:python command line
1589 - epilog -- Text following the argument de
1590 - parents -- Parsers whose arguments shoul
1591 - formatter_class -- HelpFormatter class f
1592 - prefix_chars -- Characters that prefix o
1593 - fromfile_prefix_chars -- Characters that
1594 additional arguments
1595 - argument_default -- The default value fo
1596 - conflict_handler -- String indicating ho
1597 - add_help -- Add a -h/-help option
1598
1599
> 1600 def __init__(self,
1601                prog=None,
1602                usage=None,
1603                description=None,
1604                epilog=None,
1605                parents=[],
1606                formatter_class=HelpFormatter,
1607                prefix_chars='-',
1608                fromfile_prefix_chars=None,
1609                argument_default=None,
1610                conflict_handler='error',
1611                add_help=True):
Command line: [Ctrl-X]
>>>

```

```

DEBUG Attach (Remote Debug)
server.py x launch.json
VARIABLES
  Local
  profileJson: {u'id': u'UNKNOWN', u'p...
  e: <undefined>
  json: <module 'json' from 'C:\OpenSys\Q...
  JSONDecoder: <class 'json.decoder.JS...
  JSONEncoder: <class 'json.encoder.JS...
  _default_decoder: <json.decoder.JSON...
  _default_encoder: <json.encoder.JSON...
  decoder: <module 'json.decoder' from...
  dump: <function dump at 0x303f733c>
  dumps: <function dumps at 0x303f7374>
  encoder: <module 'json.encoder' from...
  load: <function load at 0x303f73ac>
WATCH
CALL STACK
  MainThread
  Thread #772
  Thread #1029
  Thread #1286
  Thread #1543
  CP Server Thread-6
  CP Server Thread-7
  POST
  _call_
  _call_
  respond
  BREAKPOINTS

```

```

Repository: p1 Reference: master
Active Branch (master)
Initial commit
Aaron Bartell on 4/15/2016, 2:18:43 PM
more ...
Working Directory Changes
Enter the commit message
Amend previous commit
Select All 0 files selected
pgm1.rpgle
1 dcl-pr pgm1 extpgm;
2 char1 char(1);
3 decl packed(7:4);
4 end-pr;
5 dcl-pi pgm1;
6 char1 char(1);
7 decl packed(7:4);
8 end-pi;
9
10 char1 = 'C';
11 decl = 321.1234;
12 return;
13

```

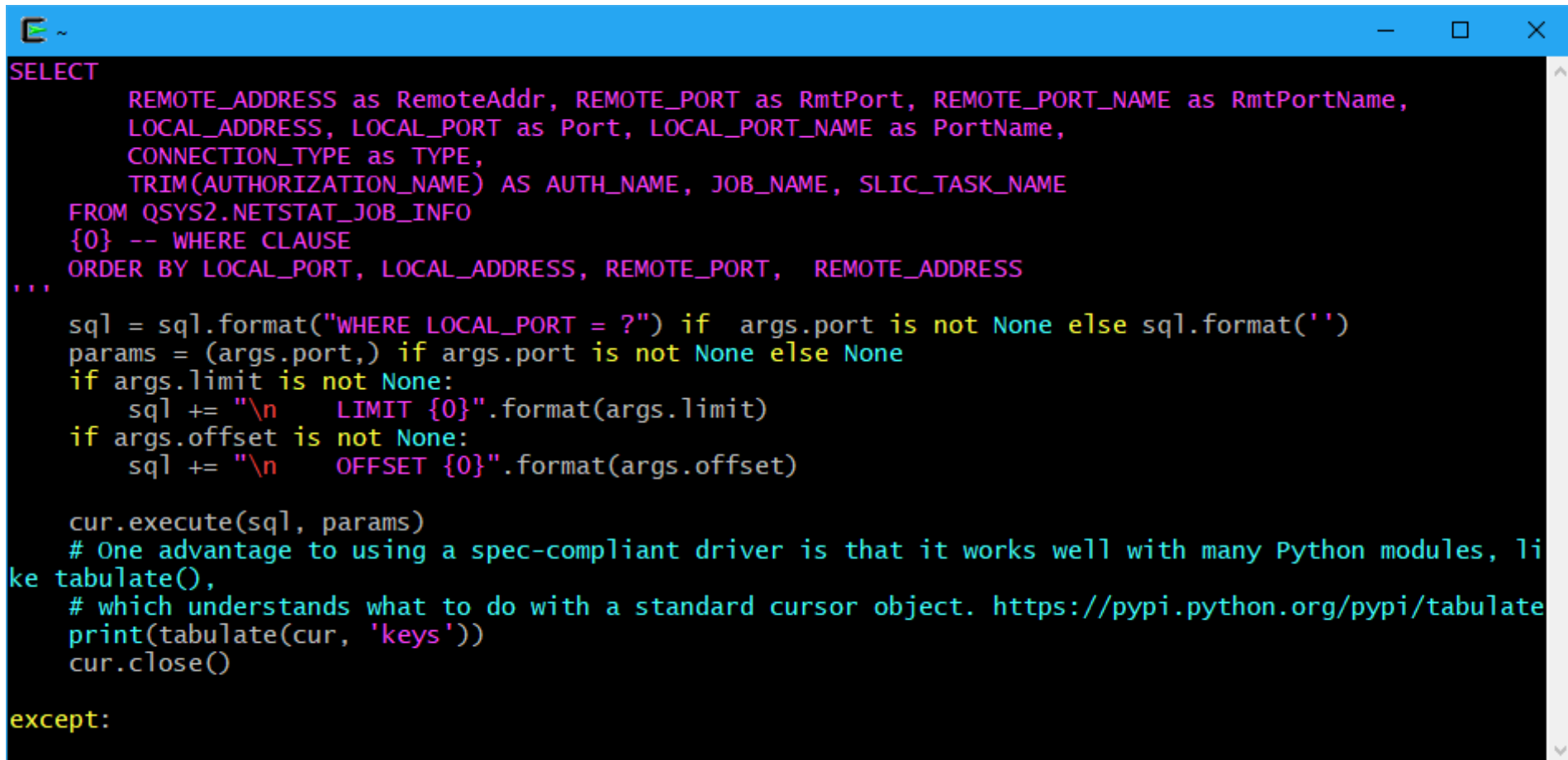
```

-bash-4.3$ npm install lpad
[.....] - loadRequestedDeps: sill install loadAllDepsIntoIdealTree

```

# vim

- (In)famous terminal-based editor



```
SELECT
    REMOTE_ADDRESS as RemoteAddr, REMOTE_PORT as RmtPort, REMOTE_PORT_NAME as RmtPortName,
    LOCAL_ADDRESS, LOCAL_PORT as Port, LOCAL_PORT_NAME as PortName,
    CONNECTION_TYPE as TYPE,
    TRIM(AUTHORIZATION_NAME) AS AUTH_NAME, JOB_NAME, SLIC_TASK_NAME
FROM QSYS2.NETSTAT_JOB_INFO
{0} -- WHERE CLAUSE
ORDER BY LOCAL_PORT, LOCAL_ADDRESS, REMOTE_PORT, REMOTE_ADDRESS
...

sql = sql.format("WHERE LOCAL_PORT = ?") if args.port is not None else sql.format('')
params = (args.port,) if args.port is not None else None
if args.limit is not None:
    sql += "\n    LIMIT {0}".format(args.limit)
if args.offset is not None:
    sql += "\n    OFFSET {0}".format(args.offset)

cur.execute(sql, params)
# One advantage to using a spec-compliant driver is that it works well with many Python modules, li
ke tabulate(),
# which understands what to do with a standard cursor object. https://pypi.python.org/pypi/tabulate
print(tabulate(cur, 'keys'))
cur.close()

except:
```

# Midnight Commander

- Two-pane file manager
  - FTP access
  - Compare files
  - Compare directories
  - Edit files
  - Move, copy, delete, etc.
  - Subshell
  - Scroll wheel
  - Modify file info

mc [timmr@Common1.Frankeni.com]:~

Name	Size	Modify time
..	UP--DIR	Sep 4 11:11
./cache	8192	Aug 14 20:44
./config	8192	Aug 14 20:44
./local	8192	Aug 14 20:44
./node-gyp	8192	Sep 10 18:20
./npm	12288	Sep 10 18:22
./myrepo	8192	May 16 12:22
./ssl_certs	12288	Jul 20 16:39
./bash_history	9250	Sep 13 14:13
./bash_profile	218	Jun 21 11:21
./node_repl_history	33	Aug 27 13:00
./sh_history	788	Jul 6 14:26
./vi_history	18	Aug 15 09:03
*.a.out	14957	Jun 21 11:19
bootstrap.sql	1054	Apr 18 19:51
hello.cpp	107	Jun 21 11:18
upd2.data	223872	Jul 16 19:45
updcommon.data	31338K	Jul 16 18:36

UP--DIR 79G/327G (24%)

Hint: Use C-x t to copy tagged file names to the command line.  
bash-4.4\$

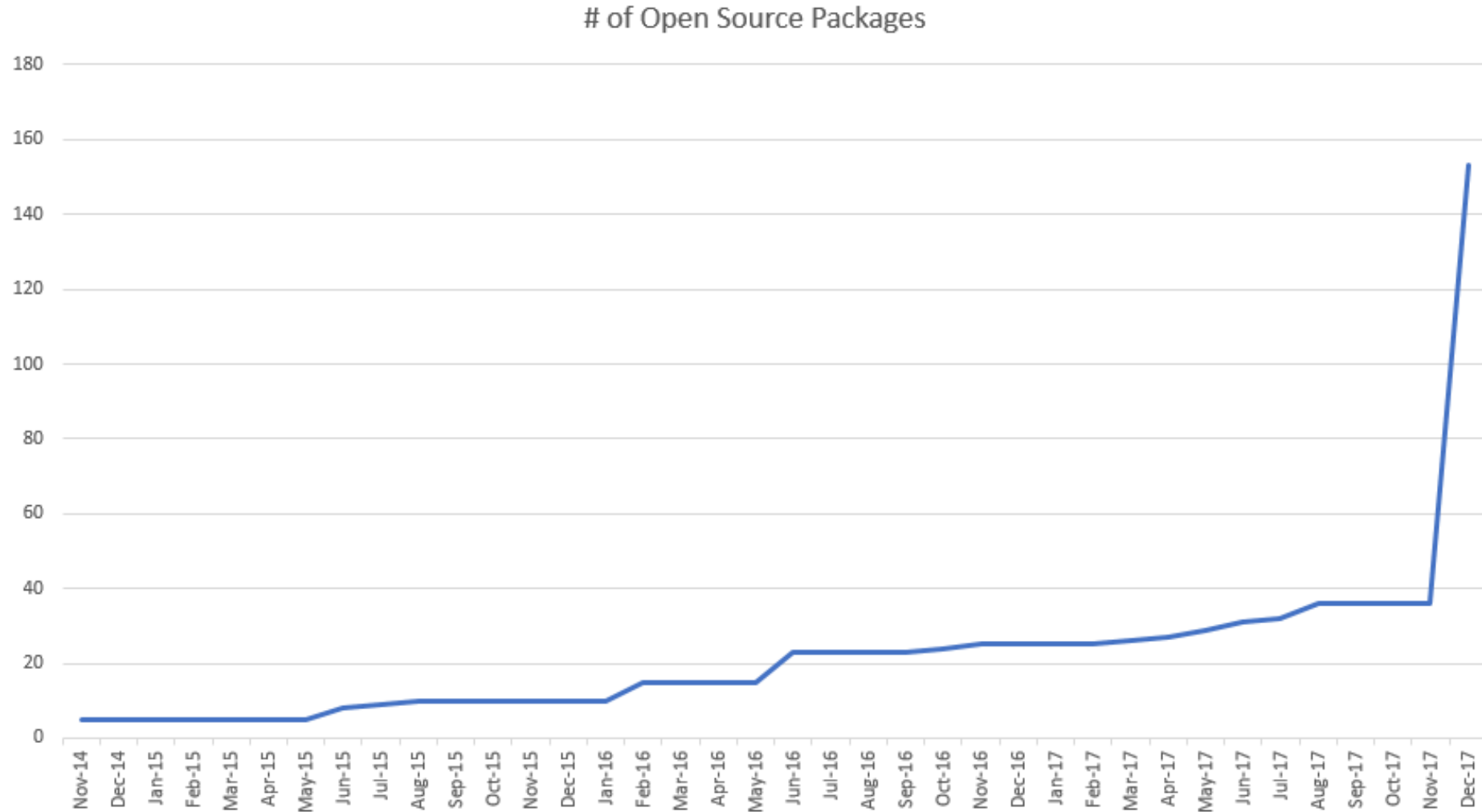
1Help 2Menu 3View 4Edit 5Copy 6RenMov 7Mkdir 8Delete 9PullDn 10Quit



# IBM delivers new software often

- IBM i Open-Source Software Team works to deliver the best of open-source software to IBM i
  - Languages (Node.js, Python, Lua, Perl, etc.)
  - Machine learning
  - Integration with Db2, RPG, CL, etc.
  - New tools for developing applications with open-source software
  - Important pieces for the IBM i open-source ecosystem
- Also contributes to open-source projects, maintain key partnerships, documents software for IBM i users, and much more

# The number of packages is growing



# You can check what's available

- When you have yum installed, you can query your repositories to see what open-source software is available

```
$ yum list available
```

- Or you can view the repository in your browser to see available packages

<ftp://public.dhe.ibm.com/software/ibmi/products/pase/rpms/repo/>

# You can check what's available

```

mirish@oc6133424434:~
File Edit View Search Terminal Help
-bash-4.4$ yum list available
Available Packages
R.ppc64                               3.5.1-5                Artifactory
R-devel.ppc64                         3.5.1-5                Artifactory
activemq.noarch                       5.11.1-1              Artifactory
ant.ppc64                             1.10.5-1              Artifactory
ant-doc.ppc64                         1.10.5-1              Artifactory
binutils-pase-chroot.ppc              7.3-0                  internal-ibmi-chroot
boost.ppc64                           1.65.1-0              Artifactory
boost-devel.ppc64                     1.65.1-0              Artifactory
bzip2.ppc64                           1.0.6-13              Artifactory
bzip2-devel.ppc64                     1.0.6-13              Artifactory
cblas-devel.ppc64                     3.8.0-0               Artifactory
ccache.ppc64                           3.2.7-1               Artifactory
cloud-init.ppc64                      1.2-100               ibm
coreutils-pase-chroot.ppc             7.3-1                  internal-ibmi-chroot
cpio-gnu.ppc64                        2.12-0                 Artifactory
curl.ppc64                            7.65.3-3              Artifactory
curl-devel.ppc64                      7.65.3-3              Artifactory
cyrus-sasl.ppc64                       2.1.26-0              Artifactory
cyrus-sasl-devel.ppc64                 2.1.26-0              Artifactory
db2util.ppc64                          1.0.9-0               Artifactory
deltarpm.ppc64                         3.6.1-2               Artifactory
devtools-pack.ppc64                   0.1.1-0               Artifactory
expat.ppc64                           2.2.0-0               Artifactory
expat-devel.ppc64                     2.2.0-0               Artifactory
file.ppc64                             5.32-5                Artifactory
file-devel.ppc64                       5.32-5                Artifactory
filesystem-chroot.noarch              7.3-0                  internal-ibmi-chroot
flex-devel.ppc64                       2.6.3-1               Artifactory
gcc-gfortran-aix.fat                   6.3.0-24              Artifactory
gdb.ppc64                              7.9.1-4               Artifactory
gettext-examples.ppc64                 0.19.8-0              Artifactory
gettext-runtime.ppc64                  0.19.8-0              Artifactory
gettext-tools.ppc64                    0.19.8-0              Artifactory
ghostscript.ppc64                      9.21-0                Artifactory

```

**How can I get open-source software?**

# 5733-OPS is dead

- Open-source software used to be delivered by 5733-OPS
- Most 5733-OPS options are already out of support
- The following options will be out of support as of December 15<sup>th</sup> 2019
  - Option 4: Python 2.7
  - Option 6: Git
  - Option 7: Tools
  - Option 9: Cloud-init
  - Option 11: Nginx

# RPMs now deliver open-source software

- RPMs are packaged up binaries and where to install them
- When you install RPMs (with yum), all of the files will be placed in the correct location in the IFS
- When you uninstall open-source software, the files and all dependencies will be removed from your system
- <http://ibm.biz/ibmi-rpms>

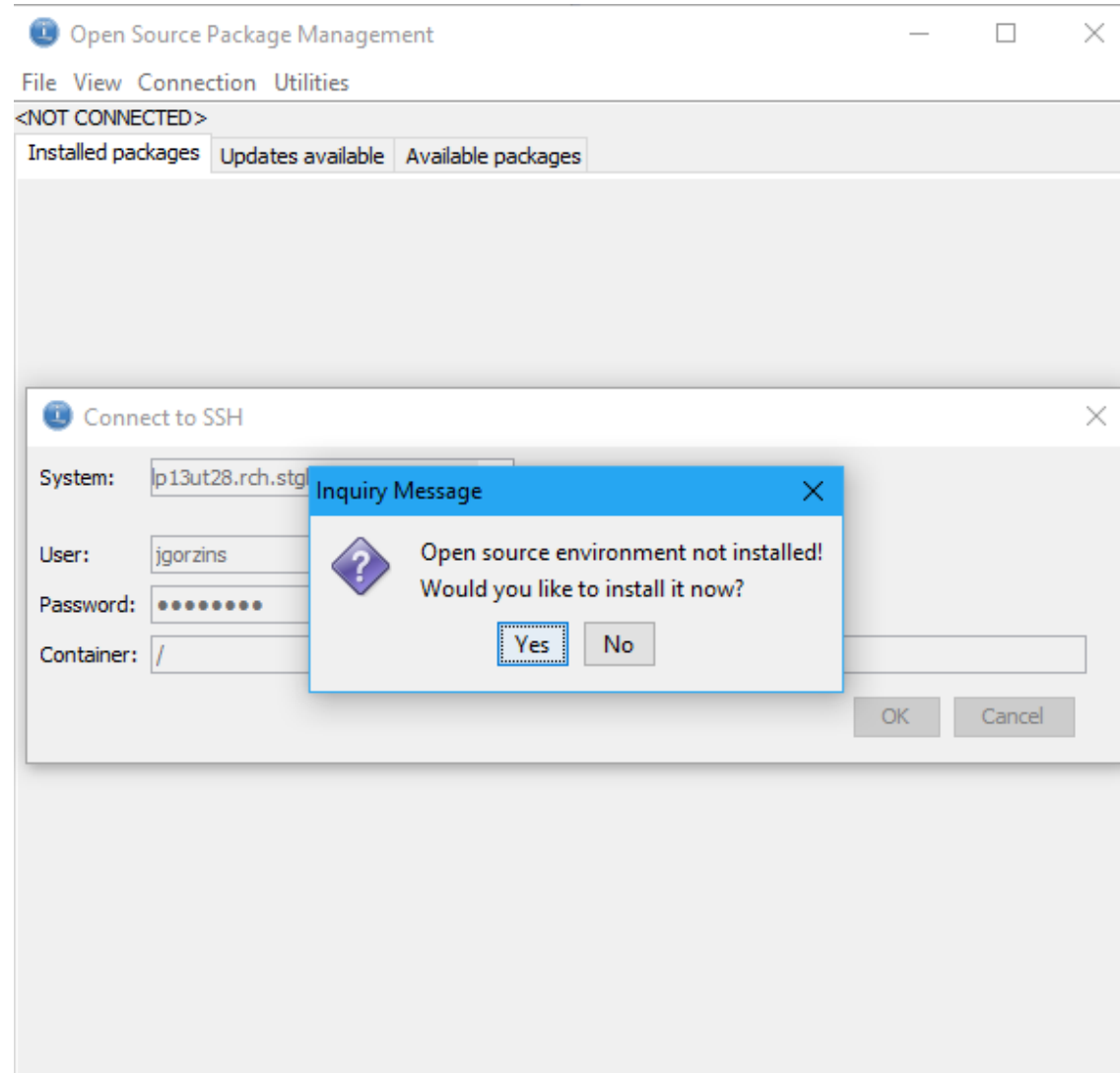


# Why RPMs?

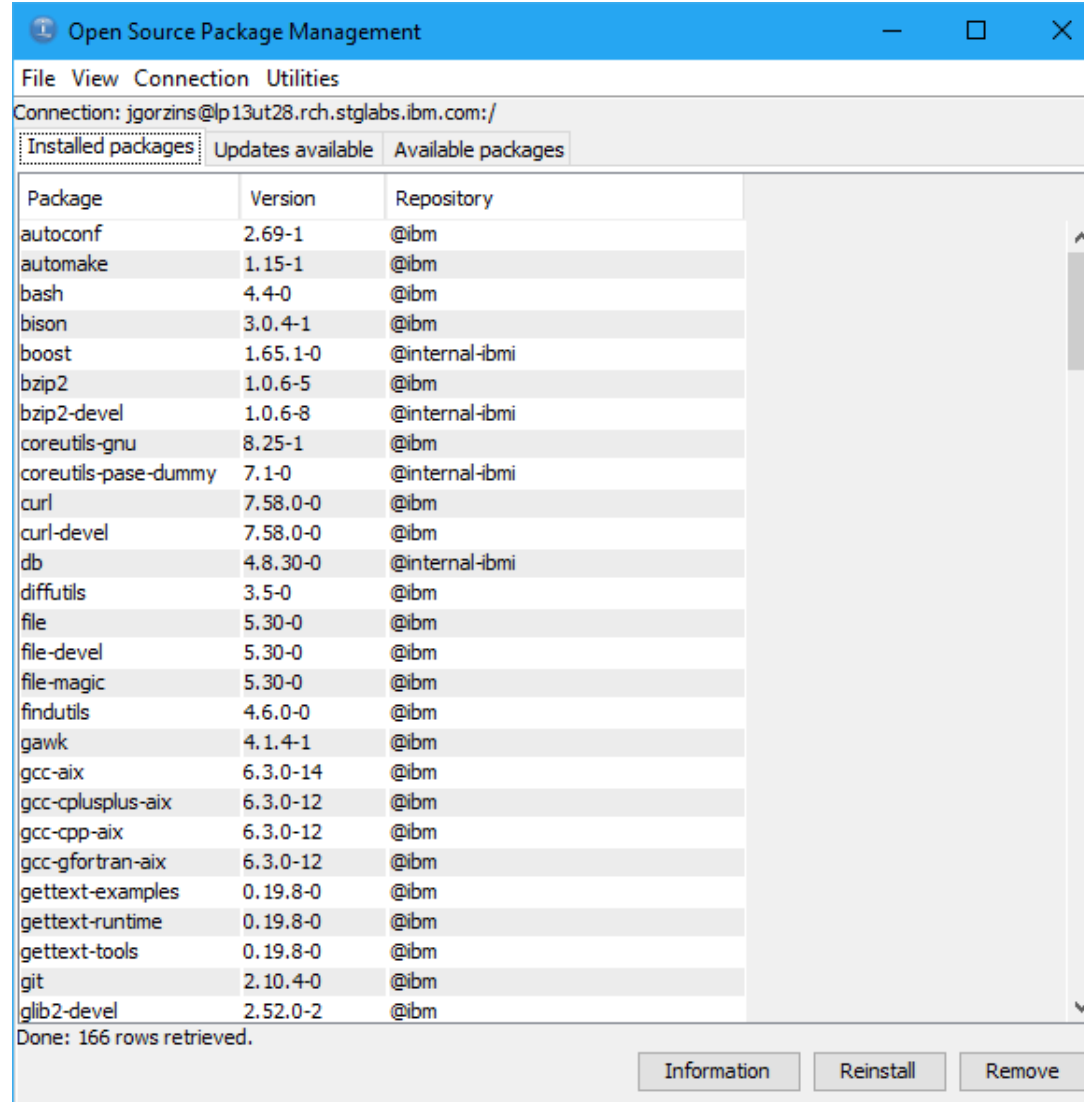
- PTFs and other IBM i-specific ways are a poor fit for open-source software, which is usually built for Unix systems
- RPMs allow much faster delivery of open-source packages and patches for these packages
  - Automated tests, continuous integration, continuous delivery
  - Dozens of 5733-OPS options, hundreds of RPMs
- Can install the entire open-source environment and all packages in a matter of minutes



# Managing open-source with ACS



# Managing open-source with ACS



The screenshot shows a window titled "Open Source Package Management" with a menu bar (File, View, Connection, Utilities) and a connection string: "Connection: jgorzins@lp13ut28.rch.stglabs.ibm.com:/". Below the menu bar are three tabs: "Installed packages" (selected), "Updates available", and "Available packages". The main area contains a table with three columns: "Package", "Version", and "Repository". The table lists 28 packages, including autoconf, automake, bash, bison, boost, bzip2, bzip2-devel, coreutils-gnu, coreutils-pase-dummy, curl, curl-devel, db, diffutils, file, file-devel, file-magic, findutils, gawk, gcc-aix, gcc-cplusplus-aix, gcc-cpp-aix, gcc-gfortran-aix, gettext-examples, gettext-runtime, gettext-tools, git, and glib2-devel. At the bottom, it says "Done: 166 rows retrieved." and there are three buttons: "Information", "Reinstall", and "Remove".

Package	Version	Repository
autoconf	2.69-1	@ibm
automake	1.15-1	@ibm
bash	4.4-0	@ibm
bison	3.0.4-1	@ibm
boost	1.65.1-0	@internal-ibmi
bzip2	1.0.6-5	@ibm
bzip2-devel	1.0.6-8	@internal-ibmi
coreutils-gnu	8.25-1	@ibm
coreutils-pase-dummy	7.1-0	@internal-ibmi
curl	7.58.0-0	@ibm
curl-devel	7.58.0-0	@ibm
db	4.8.30-0	@internal-ibmi
diffutils	3.5-0	@ibm
file	5.30-0	@ibm
file-devel	5.30-0	@ibm
file-magic	5.30-0	@ibm
findutils	4.6.0-0	@ibm
gawk	4.1.4-1	@ibm
gcc-aix	6.3.0-14	@ibm
gcc-cplusplus-aix	6.3.0-12	@ibm
gcc-cpp-aix	6.3.0-12	@ibm
gcc-gfortran-aix	6.3.0-12	@ibm
gettext-examples	0.19.8-0	@ibm
gettext-runtime	0.19.8-0	@ibm
gettext-tools	0.19.8-0	@ibm
git	2.10.4-0	@ibm
glib2-devel	2.52.0-2	@ibm

Done: 166 rows retrieved.

Information Reinstall Remove

# Managing open-source with yum

- Install/remove packages
- Check for updates
- Check what packages are available
- Check versions of packages
- Check what package ships a certain file
- See the installation and update history for a package

# Managing open-source with yum

```
-bash-4.3$ yum install nginx
Setting up Install Process
Resolving Dependencies
--> Running transaction check
---> Package nginx.ppc64 0:1.13.8-3 will be installed
--> Processing Dependency: lib:/QOpenSys/pkgs/lib/libcrypto.so.1.1(shr_64.o)(ppc64) for package: nginx-1.13.8-3.ppc64
--> Processing Dependency: lib:/QOpenSys/pkgs/lib/libssl.so.1.1(shr_64.o)(ppc64) for package: nginx-1.13.8-3.ppc64
--> Running transaction check
---> Package libopenssl1_1.ppc64 0:1.1.1-1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package                                Arch                                Version                                Repository                            Size
=====
Installing:
nginx                                  ppc64                               1.13.8-3                              ibm                                    1.2 M
Installing for dependencies:
libopenssl1_1                         ppc64                               1.1.1-1                              ibm                                    2.0 M
=====

Transaction Summary
=====
Install      2 Packages

Total size: 3.2 M
Installed size: 14 M
Is this ok [y/N]: |
```

# **How can I use open-source software?**

# There are lots of resources out there

- The only unique thing about most open-source software on IBM i is connecting to Db2, calling PGMs, etc.
- The rest of open-source software on IBM i is the same as open-source software on any other platform
  - That means that you can use any online tutorial, and only calling IBM i resources will be unique

# Some IBM open-source resources

- IBM i Open-Source Software Team has created some resources for you to get started using open-source software:
  - <http://ibm.biz/ibmi-rpms>
  - <https://github.com/IBM/ibmi-oss-examples>

# Traditional open-source software

- RPM pile has community support, available through:  
<https://bitbucket.org/ibmi/opensource/issues>
- IBM supports some integration pieces
- Vendor support for Zend Server and Power Ruby
- Most open-source packages have community support



# Professional support for open-source software



## Linux Subscription & Support

- Subscription & support for all major distributions of Linux including
- Linux system-level skills for multiple products
- Unmatched skills on IBM® System z®, IBM Power® and OEM Intel
- Focus on speed to resolution with direct access to IBM resources
- Basic, Enhanced & Premier support options available
- 99% TSS fix rate



## Commercial OSS Subscription & Support

- TSS can provide support solutions for the Red Hat & SUSE product portfolios
- Support for private cloud infrastructures running on multiple OpenStack distributions
- Software Defined Storage including Red Hat Ceph, Red Hat Gluster & SUSE Enterprise Storage
- Docker EE support available for IBM Power and System z platforms



## Community OSS Support

- Enterprise-class support for 100+ community versions of open source software
- IBM delivered L1/L2 support
- Available across x86, Power and System z
- Support includes diagnostics & virtually unlimited assistance with how-to, usage, configuration, installation, product compatibility and interoperability questions

### Supported Packages include:

Apache HttpServer	OpenJDK
MariaDB	Elasticsearch
MongoDB	Logstash
MySQL	Kibana
PostgreSQL	Cassandra
ActiveMQ	CouchDB
Rabbit MQ	Redis
Tomcat	Maven
NGNIX	Apigility
WordPress	GitLab
SugarCRM	CephFS
Docker	Kafka
Kubernetes	OpenLDAP
Chef	OpenSSL
Puppet	Zookeeper
Spark	Nagios
Jenkins	PHP



# Notable IBM i supportables

- Git
- Jenkins
- rsync
- Node.js
- Apache Tomcat
- WordPress
- Python

# A great place to start

- If you want to learn more about open-source software support on IBM i, see Jesse Gorzinski's blog post:

<https://ibmsystemsmag.com/Trends/12/2018/game-changer-open-source-support>

# Conclusions

# The open-source revolution

- IBM i is in the middle of an open-source software revolution
  - Explosion of software available on the system over the last 3 years since the switch to RPMs
  - New software is being added weekly
  - More tools, languages, and capabilities on IBM i than ever before
- We continue to solicit feedback on what you want to see on IBM i
  - Community engagement is key for success of open-source on the system (so far, we have been really impressed)

# Normalization of IBM i

- Open-source software on IBM i is greatly helping to normalize the system
  - Familiar tools
  - Industry-standard technology
  - Industry-standard techniques
- Open-source software on IBM i makes the hiring pool much larger
- If you hire any developer off the street, or a new college graduate, they are much more familiar with open-source software

# Community engagement

- Attend sessions at conferences and ask questions
- Share code tips and tricks on public forums
- Make code contributions
- Where?
  - Ryver: <https://ibmiooss.ryver.com/>
  - Midrange “Open Source” thread:  
<https://archive.midrange.com/opensource/>
  - LinkedIn IBMiOSS group
  - GitHub: <https://github.com/ibm/ibmi-oss-examples>

# Community engagement

- IBM i Open-Source Software Team is active on Twitter
  - @IBMJesseG
  - @kadler\_ibm
  - @markdirish
- Questions, just tweet #IBMiOSS!

