



World of Open Source on IBM i

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Agenda

- Strategy & Success Stories
- What is IBM i doing?
- Latest News

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Strategy and Success Stories

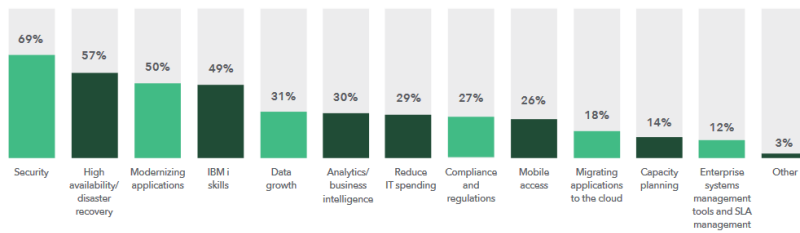


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IBM i Marketplace Survey (HelpSystems)

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

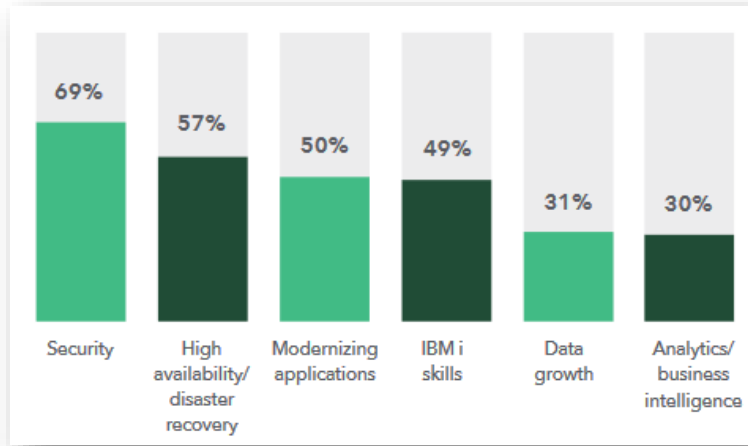


<https://www.helpsystems.com/resources/guides/ibm-i-marketplace-survey-results>

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What are your top concerns as you plan your IT environment? (check all that apply)




<https://www.helpsystems.com/resources/guides/ibm-i-marketplace-survey-results>



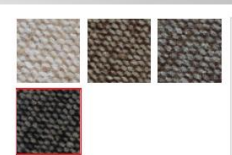
<https://www.ibm.com/case-studies/c223622o41231s41>

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Model : BRAINBUILDER mono-move



Choose the colour of your fabric. 3/3



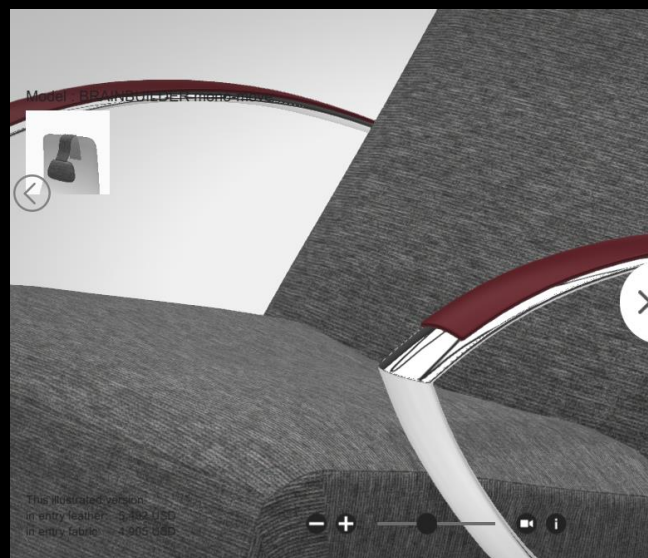
salerno C0005

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



Choose the desired colour of your armrests. 3/3



celia cherry

Selling price of your configuration: 4,886 USD

Previous Next

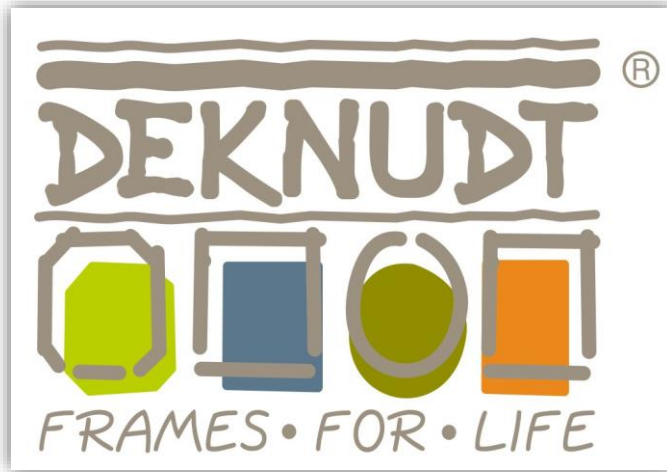
SIZE OPTIONS COVERING ARMRESTS BASE Your model BRAINBUILDER

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



Deknudt Frames

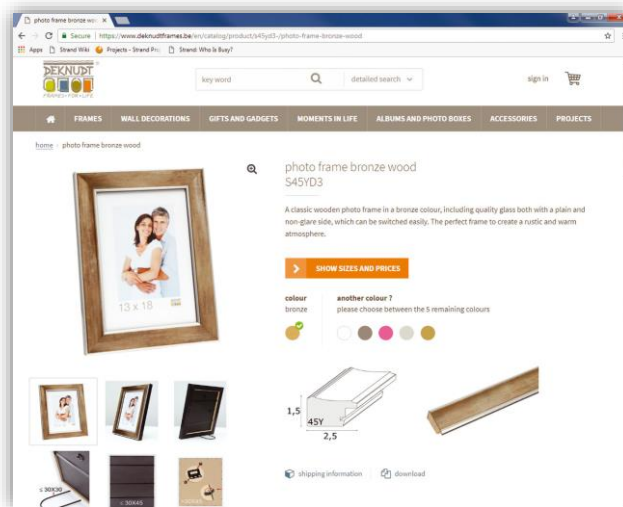
- <https://www.ibm.com/case-studies/deknudt-frames>



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Deknudt Frames



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Deknudt Frames

“By launching its **new e-commerce platform on IBM i on the Power Systems platform**, Deknudt Frames has expanded its market reach, given retail partners an out-of-the-box web store they can integrate into their own websites, streamlined payment and inventory processing, and reduced the cost of IT administration.

Deknudt says: “We have also enabled our retail partners to offer a much wider selection of our products to their customers. Now, retailers can stock the most popular items, and if a shopper would like something slightly different, the retailer can easily place an order with us. The solution is enabling us to broaden our market reach—we anticipate that this will soon drive higher revenues.”

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Deknudt Frames

- “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.”

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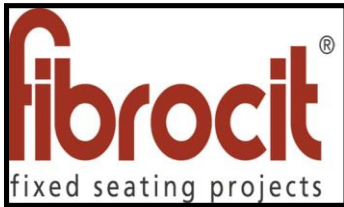


Case studies galore



“The ability to run the latest open source software alongside unmodified code from the 1980s is surely unheard of on any other platform, and this offers huge value to our business in terms of reducing both ongoing risk and costs in IT.”

<https://www.ibm.com/case-studies/cras-systems-open-source>



“The fact that the platform supports open source solutions means that we can leverage the very best technology and benefit from the support and development of the open source community while avoiding inhibitive licensing costs.

<https://www.ibm.com/case-studies/fibrocit-systems-furniture-design>

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Case studies galore



“Everything – both core business systems and the new open source solutions – runs on IBM i, so reliability is perfect as always. And the faster processes have certainly made our lives easier.”

<https://cms.ibm.com/case-studies/winsol-systems-hardware-manufacturing-digitization>



“We can develop in C, PHP, Java – there’s now a full range of open source software on the platform that meshes seamlessly with the core technologies that we’ve been running for decades.”

<https://cms.ibm.com/case-studies/kube-pak-systems-gardening-wholesale>

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Case studies galore



"The website runs using a combination of RPG and open source software. All of it integrates seamlessly with the IBM i operating system"

<https://www.ibm.com/case-studies/immo-bonehill-systems-hardware-website-compliance>



"The solution combines tried-and-trusted systems with the latest in open source innovation to create new value."

<https://www.ibm.com/case-studies/ORIS>

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Happy 30th Anniversary!

At IBM, we value and appreciate your trust in running your business on IBM i. We are inspired by how IBM i clients in 117 countries are creating innovative solutions and extending the reach of the system.

It is an honor to have you as our clients, our partners, and in many cases, our friends. Please enjoy some of the amazing stories of our customers, who are pushing the IBM i platform in new and innovative ways.

Thank you.


Alison Butterill
IBM i Offering Manager


Steve Will
IBM i Chief Architect

To celebrate, IBM is offering a special IBM i 30th Anniversary Edition available for the IBM Power System S914 4-core server

[Learn more about this offer](#)

See innovation at work in the IBM i community



Geodis
Managing complex worldwide logistics with IBM i

[Read the customer story →](#)



Svenska Handelsbanken AB
Thriving with fast transactional growth on IBM i

[Read the customer story →](#)

[Read More Stories](#)

<http://ibm.biz/ibmi30years>



IBM i 30th Anniversary Customer Stories

- Norwegian Air Ambulance Foundation: PHP
- FRS: PHP
- Sunstate: PHP
- Krengeltech: Node.js, Python, chroot
- Robertet: Java
- Kube-Pak: PHP, Java, More
- Mutual Distributing Company: Node.js, Ruby, Python, PHP
- Deknudt Frames: Web tech, Ghostscript, ImageMagick
- Mission Produce and Avocado Packing Company: PHP
- JORI: ibmichroot (containers), gaming software

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IBM i 30th Anniversary Customer Stories – CONTINUED!!

- Geodis: Node.js
- RPC Superfos: Python, Node.js
- King III Solutions: PHP
- Fuyo General Lease: PHP, SugarCRM
- HT BENDIX A/S: Open Source Licensed Program
- ORIS: PHP, Drupal, curl, ImageMagick
- Assura: the latest open source solutions
- Cras: the latest open source components
- Kuehne + Nagel S.à.r.l.: Node.js
- Carnegie General Insurance Agency: .NET
- TMISI: Web technologies

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Customer stories

- “Three Ways Open Source Brings Business Value”
<http://ibmsystemsmag.com/blogs/open-your-i/november-2018/three-ways-open-source-brings-business-value/>

Blog

Open Your i



By Jesse Gerzani

November 5, 2018

Previous Post | Next Post | See All Posts

Three Ways Open Source Brings Business Value

The IBM i development teams have been delivering new open source software at a mind-boggling rate. In fact, it's hard to keep up! Since our move to RFPs in May, hundreds of new packages have been delivered that help with application development, system administration and many things in between. In fact, I was in the middle of writing a short blog post about a tool called "Midnight Commander" when Steve Will published a discussion about some of our business results.

In a blatant and gratuitous attempt to ride Steve's coattails, I decided to instead focus on business value with this blog post. After all, open source has been bringing victories for IBM i clients around the globe. As it turns out, a few of these open source wins have been showcased in some recent case studies. So, that's the agenda for today. I'm going to highlight three case studies. Each one highlights a particular manner in which open source software can bring value to your enterprise!

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What is IBM i doing?





What are IBM i teams doing?

- Delivering open source technology
 - Languages (Node.js, Python, Lua, Perl, etc)
 - Machine Learning capabilities
 - Integration to RPG, Db2, etc.
 - User Tools (git, vim, Midnight Commander, lftp, rsync, bash, etc)
 - Developer Tools (compilers, build toolchain, RPM build tools)
 - Important ecosystem pieces
- Contributing to open source projects. Nature of contributions (50+ projects):
 - IBM i porting
 - General enhancements
 - Complete authorship
 - Documentation improvements
- Maintaining key partnerships
- Participating in the open source community

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5733-OPS Roadmap

5733-OPS

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5733-OPS Roadmap

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5733-OPS Roadmap



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5733-OPS Update

- Planning pages updated to reflect 5733-OPS end of life
<https://www-01.ibm.com/support/docview.wss?uid=nas8N1022039>

“IBM i Open Source Solutions packages are now delivered via RPMs rather than via 5733-OPS Licensed Program Product (LPP) options. For more information on how to acquire the software via RPMs, refer to the documentation at <http://ibm.biz/ibmi-rpms>

Effective September 24, 2018, the following options no longer receive support or fixes:

- Option 1 (Node.js beta release)
- Option 3 (chroot and compiler enablement)
- Option 5 (Node.js version 4)
- Option 8 (Eclipse Orion)

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5733-OPS Update

The remaining options will no longer receive support or fixes beyond the following dates:

- Option 2 (Python 3.4): February 28, 2019
- Option 10 (Node.js version 6): April 4, 2019
- Options 4, 6, 7, 9, and 11: December 15, 2019

All future open source packages are delivered via RPM only.

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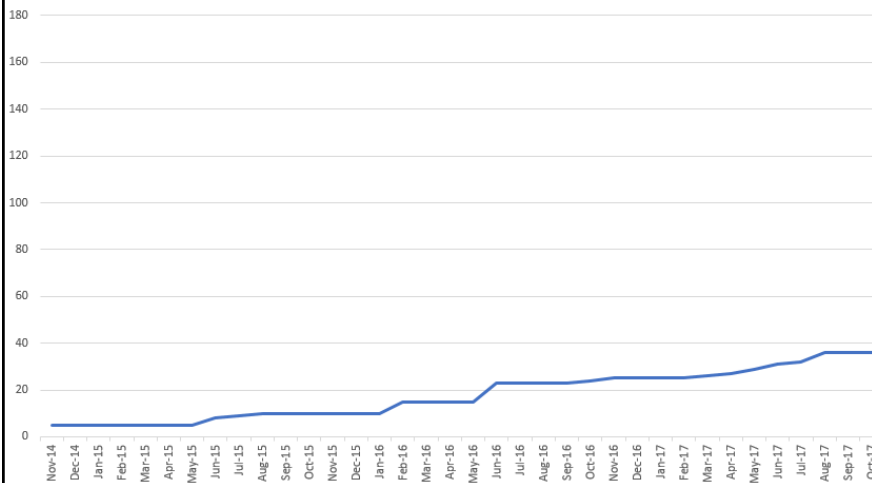


Demo – Installing Open Source for the first time!

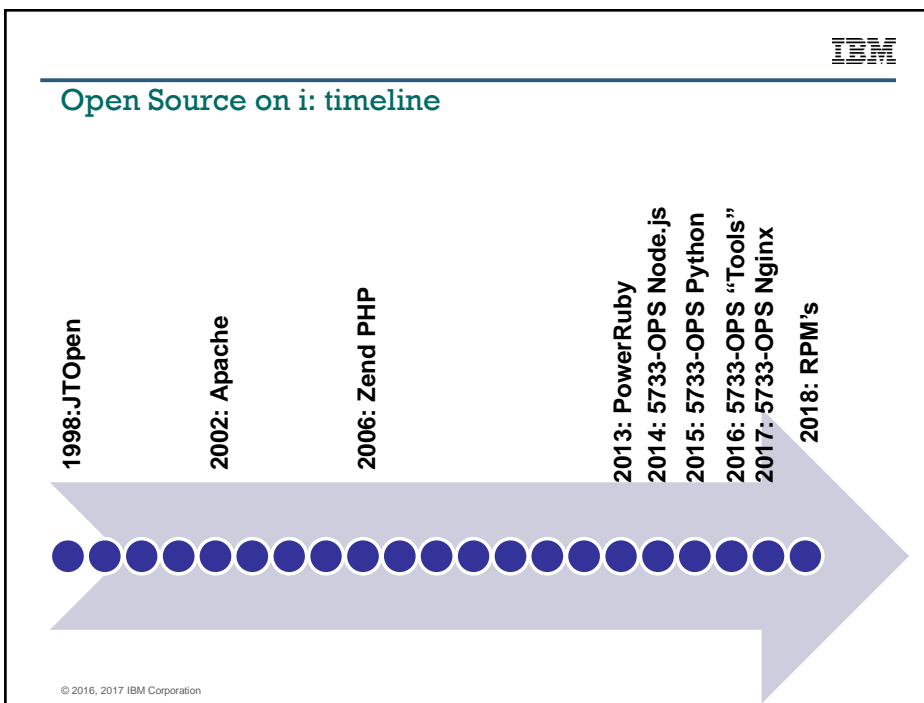
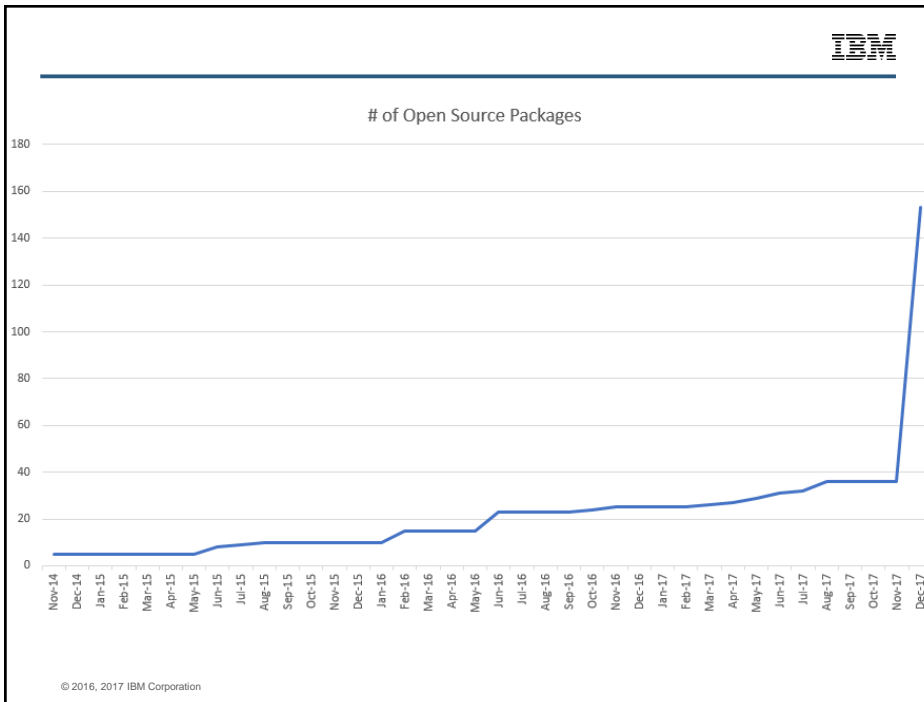
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of Open Source Packages



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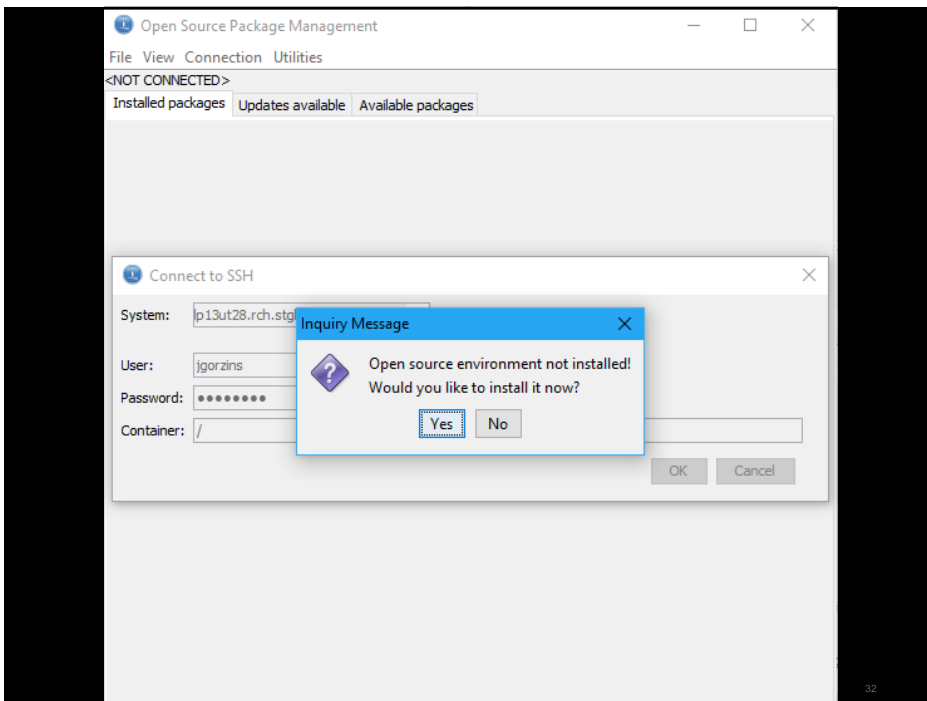
Move to RPM's significant

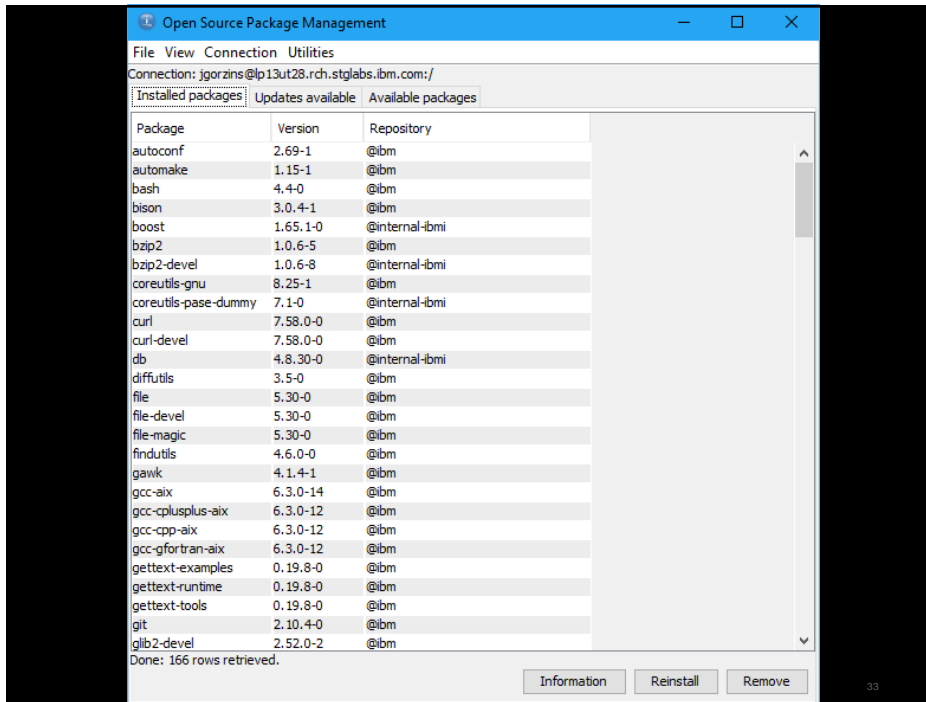
- 5733-OPS is no longer needed!
- Allows delivery of much more technology
 - Automated build+test, continuous integration, continuous delivery
 - Dozens of packages in 5733-OPS, hundreds in RPM
- Allows faster delivery of security fixes
- Install an entire open source ecosystem in a matter of minutes!!
- Allows more parties to build, support, or distribute open source technology

- To get started:
- <http://ibm.biz/ibmi-rpms>



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yum command line tool

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

```

-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/pkgsrc/lib/libcrypto.so.1.1(shr_64.o)(ppc64) for package: nginx-1.13.8-3.ppc64
--> Processing Dependency: lib:QOpenSys/pkgsrc/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]: |

```



Demo – Installing needed packages

- To pull demo from BitBucket:
 - git
- To build native code
 - gcc packages
 - libstdcplusplus-devel
 - make-gnu
- To run the demo
 - nodejs10



What is IBM i doing? Languages

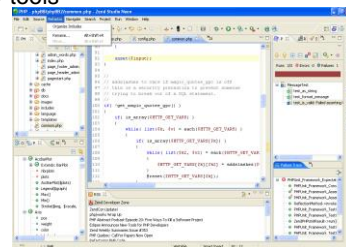


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What IBM i is doing –partnership Rogue Wave

- Zend Server for i
 - Preloaded with IBM i 7.1 and 6.1
 - One year of Silver Support from Zend
- Zend Server Development edition
 - Reduced cost – include Z-Ray and other dev tools
- Zend Studio for i
 - Eclipse-based development environment
 - One year of Silver support from Zend
- Zend DBi
 - MySQL implementation for IBM i
 - Db2 Storage Engine enables data storage in Db2 for i



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IBM i Shops using 



















What IBM i is doing – partnership with PowerRuby

- What is PowerRuby?
 - Freely available and commercially supported port of the Ruby language
 - Includes supporting infrastructure (i.e. Rails) for Ruby web applications on IBM i
 - Available for download from PowerRuby.com
 - Includes native DB2 database driver – MySQL not necessary
 - Integrates with XMLSERVICE for access to IBM i programs and objects
- Components
 - Ruby 2.0.0 and 1.9.3 (MRI implementation, a.k.a CRuby)
 - ibm_db (IBM supported - <http://rubyforge.org/projects/rubyibm/>)
 - Apache + Thin ← the web server stack (more Ruby app servers options coming)
 - Rails 3.2.x and 4.0.0 (CoffeeScript support in the works)
- Learn more
 - PowerRuby.com for updates and news
 - twitter.com/rubyonpower



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Python

- What's Python?
 - A powerful general-purpose language
 - Interpreted
- Why Python?
 - Easy to use
 - Language is designed to be a "fun" language
 - Can be considered the 'CL language for the modern programmer'
 - Easy for IBM i programmers to learn
 - Very, very popular
 - Over 130,000 third-party extensions are available on <http://pypi.org>



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Origin of the "Python" name?

"Now, it's quite simple to defend yourself against a man armed with a banana. First of all you force him to drop the banana; then, second, you eat the banana, thus disarming him. You have now rendered him helpless."

"This parrot is no more! He has ceased to be!"

"I'm sorry to have kept you waiting, but I'm afraid my walk has become rather sillier recently."

"I don't like Spam@!"

"That rabbit's dynamite!"

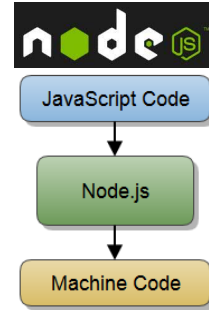
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Node.JS

- What's Node.JS?
 - Simply put, Node.js is server-side JavaScript
 - Based on Google Chrome V8 Engine.

- Why Node.JS?
 - Great for web development!
 - JavaScript is already widely used on the client side of web development
 - Can now do both
 - High Performance
 - Node.js is designed to maximize throughput and efficiency.
 - Increasing popularity:
 - More than 650,000 third-party extensions are available on www.npmjs.org now.



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Some numbers

125,000 Python modules

- Python Package Index (pypi.python.org)



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Some numbers

700,000 Node.js packages

– Npmjs.com



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**What is IBM i doing?
Integration**

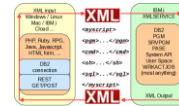


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Things we deliver with every new language/version

- FastCGI
 - Allows fast connection from HTTP server to backend PASE environment
- ILE Object Toolkit
 - Toolkit for each environment to easily allow connections to ILE objects and information – Built on XMLService
- SQL Connector
 - Easy integrated (from the open source language) way to transfer data to and from DB2 for i leveraging SQL



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IBM i Services

- With every major language, we deliver a high-performance, robust database connector!
- Access system data through SQL!
 - PTF
 - Security
 - Message Handling
 - Librarian
 - Work Management
 - Communication
 - Storage
 - Product
 - System Health
 - Journal
 - Java
- More being continuously added



<http://ibm.biz/DB2foriServices>

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IBM i Services - Examples

```
-- Description: Review the connections that are transferring the most data
SELECT BYTES_SENT_REMOTELY, BYTES_RECEIVED_LOCALLY, LOCAL_ADDRESS, LOCAL_PORT,
       REMOTE_ADDRESS, REMOTE_PORT
FROM QSYS2.NEISTAT_INFO
ORDER BY BYTES_SENT_REMOTELY + BYTES_RECEIVED_LOCALLY DESC LIMIT 10;
```

BYTES_SENT_REMOTELY	BYTES_RECEIVED_LOCALLY	LOCAL_ADDRESS	LOCAL_PORT	REMOTE_ADDRESS	REMOTE_PORT
485406	56674575	0.0.0.0		138 0	0
427724	39126540	0.0.0.0		137 0	0
12790347	19036432	0.0.0.0		657 0	0
0	1723680	0.0.0.0		427 0	0
0	1723680	0.0.0.0		427 0	0
0	1723680	::		427 ::	0
89183	51089	9.5.36.187		8475 9.77.134.79	59508
54575	39915	9.5.36.187		446 9.77.134.79	59565
59148	20944	9.5.36.187		23 9.77.134.79	59530
22848	22848	0.0.0.0		123 0	0

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IBM i Services - Examples

```
-- Description: Show me disk units and how full they are
SELECT ASP_NUMBER, UNITNBR, PERCENT_USED
FROM QSYS2.SYSDISKSTAT;
```

ASP_NUMBER	UNITNBR	PERCENT_USED
1	1	30.062
1	2	28.535
1	3	28.531
1	4	28.529
1	5	28.529
1	6	28.537
1	7	28.529

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What is IBM i doing? User and Developer Tools



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Developer access to IBM i

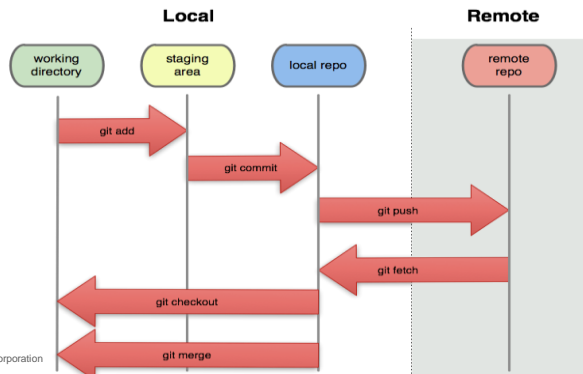
- IBM i can be accessed with an SSH client
 - X11 forwarding is supported
- Filesystem can be accessed with
 - SMB
 - sftp/scp
 - sshfs
 - ftp/ftps
 - several IBM i-specific access tools
- Tools used for editing code
 - Visual Studio Code
 - Notepad++
 - Eclipse
 - Eclipse Orion
 - vi/emacs/joe
 - Rational Developer for i

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Git

- Open Source distributed version control system
- Source control for virtually any language
- Powerful and flexible
- Can have hooks to perform custom actions when new code is integrated
- Already in use in the IBM i community



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Some of the Latest News



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.NET Available on IBM i!!

- Mono has been ported to IBM i!!
- Community Effort
- Available via third-party RPM repository

https://bitbucket.org/ibmi/opensource/src/master/docs/yum/3RD_PARTY_REPOS.md



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Easy install with yum!

```
-bash-4.4$ yum list mono\*
Available Packages
mono-complete.ppc64                5.21.0.500-0
mono-core.ppc64                    5.21.0.500-0
mono-data.ppc64                    5.21.0.500-0
mono-data-db2.ppc64                5.21.0.500-0
mono-data-oracle.ppc64            5.21.0.500-0
mono-data-sqlite.ppc64            5.21.0.500-0
mono-devel.ppc64                   5.21.0.500-0
mono-extras.ppc64                 5.21.0.500-0
mono-mvc.ppc64                     5.21.0.500-0
mono-nunit.ppc64                   5.21.0.500-0
mono-reactive.ppc64                5.21.0.500-0
mono-wcf.ppc64                     5.21.0.500-0
mono-web.ppc64                     5.21.0.500-0
mono-winforms.ppc64                5.21.0.500-0
mono-winxcore.ppc64               5.21.0.500-0
monodoc-core.ppc64                5.21.0.500-0
```

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Machine Learning enabled on IBM i

- RPM enablement
- Python enablement
- BLAS enablement
- Db2 connection

- Most famous ML packages available
 - Numpy, Pandas for data processing
 - Scipy, Scikit Learn for ML and scientific analysis
 - ipython, interactive python language support
 - nltk, natural language toolkit for natural language ML process.
 - matplotlib, jupyter notebook for visual/interactive ML/data analysis



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IBM Data Science
@IBMDaScience

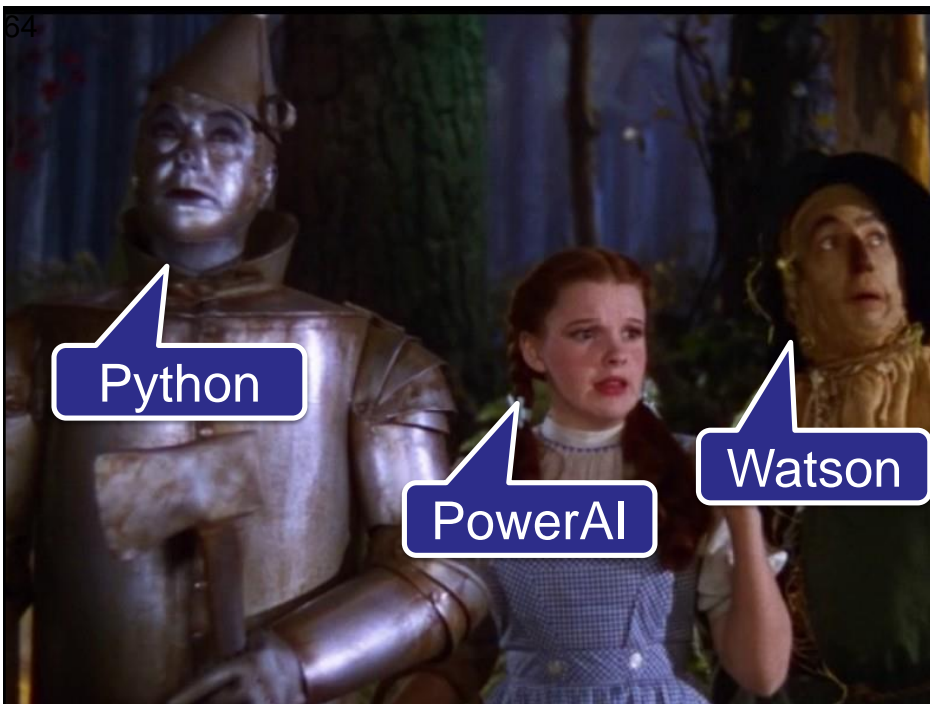
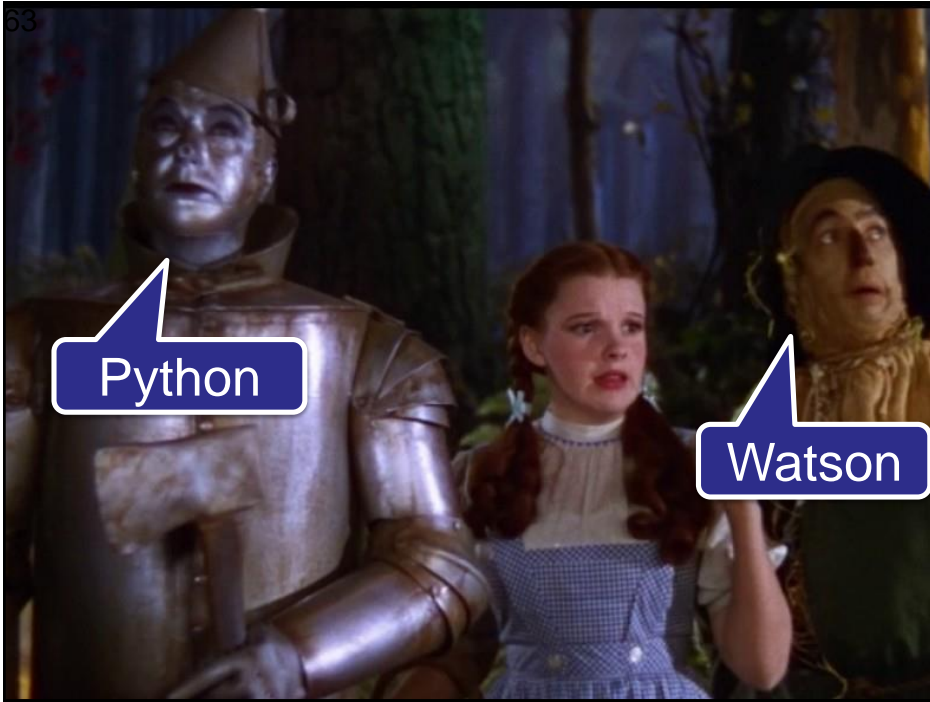
Following

Learn how to analyze #data in #Python, using numpy, pandas, scipy, and scikit-learn! A free course via @CognitiveClass: bit.ly/2EvNMZO




10:00 AM - 1 Sep 2018










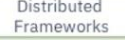
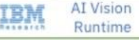


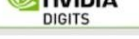






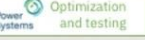




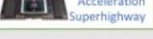





IBM PowerAI Enterprise Platform

Enterprise-Grade AI Software, Optimized for Power

<p>Deep Learning Frameworks & Enhancements</p>				
				
<p>Supporting Capabilities And Libraries</p>				
				
<p>IBM Services And Support</p>				

IBM Power Accelerated Servers: Ideal for Enterprise AI Workloads

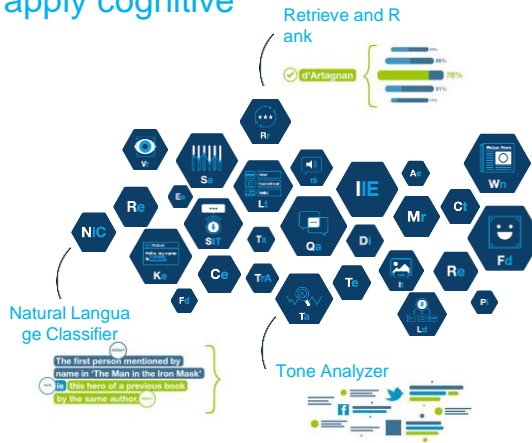
<p>IBM Power AC922</p>				
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Leverage Watson to apply cognitive capabilities.

50 underlying technologies

- Entity Extraction
- Sentiment Analysis
- Emotion Analysis (Beta)
- Keyword Extraction
- Concept Tagging
- Taxonomy Classification
- Author Extraction
- Language Detection
- Text Extraction
- Microformats Parsing
- Feed Detection
- Linked Data Support
- Concept Expansion
- Concept Insights
- Dialog
- Document Conversion
- Language Translation
- Natural Language Classifier
- Personality Insights
- Relationship Extraction
- Retrieve and Rank
- Tone Analyzer
- Emotive Speech to Text
- Text to Speech
- Face Detection
- Image Link Extraction
- Image Tagging
- Text Detection
- Visual Insights
- Visual Recognition
- AlchemyData News
- Tradeoff Analytics



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Side-by-side

	IBM Watson	IBM PowerAI	Python Libraries
On-prem or cloud?	Cloud	Either	Either
Performance	Great	Blazing	Let's not talk about it
Cost	Pay-as-you-go	Contact your IBM Rep.	Free
Db2 data access (best case)	Upload your data, or connect to cloud via API's	Connect to data from PowerAI	Direct access on-box
Available software packages	IBM Watson API set	Virtually all the major popular frameworks, including tensorflow, caffe, etc.	A small but growing subset
Hardware Stack	Built for AI and ML	Built for AI and ML	Built for business

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Open Source Support




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Open Source Support: the past (adoption inhibitor)

- 5733-OPS: **No support** (except Node.js) ☒
- RPM pile: **Community support** (except Node.js) ☒
- A few community “integration pieces”: IBM support ☺
- Zend Server, PowerRuby, many others: vendor support ☺
- Most open source frameworks and other packages: **Community support**

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Comprehensive support solutions

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
Tamcat	Maven
NGINX	Agility
WordPress	GitLab
SugarCRM	CephFS
Docker	Kafka
Kubernetes	OpenLDAP
Chef	OpenSSL
Puppet	Zookeeper
Spark	Nagios
Jenkins	PHP



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IBM Cloud Open Source Software Support

Enterprise-class support for Open Source SW is now available for more than 100+ community packages

OSS Support Offering Overview

- L1-L3 support for 100+ community versions of OSS
- IBM delivered L1/L2 with L3 provided by Rogue Wave
- Coverage includes:
 - Support includes diagnostics & virtually unlimited assistance w/ how-to, usage, configuration, installation, product compatibility and interoperability questions
 - Rogue Wave subcontractor L3 defect/usage/patches/fixes support & Community defect support for OSS packages
 - Unlimited support incidents, Phone or electronic access
 - 24x7 and 9x5 options available

Technology Support Services

- World Class support on Open Source SW for 18+ years
- System-level skills for multiple products (such as OS, hypervisor and middleware software)
- Agnostic support for all major Linux distributions
- Premium support options available
- Key contributor to the Linux development community, and major Open Source SW project communities, with 600 developers worldwide
- Access to over 7,000 skilled Linux consultants worldwide

A single source provider for near-seamless collaboration on multivendor products

Our comprehensive support model helps clients deploy open source technologies across the enterprise with confidence

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With a continuously evolving product list, we can support virtually your entire ecosystem

389DirectoryServer	CephFS	GNU sed	Maven	Python
ActiveMQ	Chef	GNU Wget	MongoDB	QEMU
Ansible	CoreOS	Grafana	MySQL	R
Apache Ant	Couchbase	Graylog	Nagios	Rabbit MQ
Apache Camel	CVS: Concurrent Versions System	gVim	Nagios Plugin	Redis
Apache Cassandra	Debian - x86 & Power only	HAProxy	Nginx	Relax and Recover (ReaR)
Apache CouchDB	DHCP (ISC DHCP)	Hibernate	Nmap	rsync
Apache Derby	Docker Engine	HornetQ	Node.js	Samba
Apache HttpServer	Docker Registry	iptables	OpenJDK	SELinux
Apache Maven	Docker Swarm	Java	OpenLDAP	Sendmail
Apache ServiceMix	Drupal	Jenkins	OpenSSL	Spring
Apache Solr	Elasticsearch (ELK)	Joomla!	OpenVPN	Subversion
Apache Spark	FluentD	Kafka	oVirt	SugarCRM
Apache Tomcat	Galera	Kibana	Perl	Vim
ApacheCXF	Gawker	Kubernetes	PhantomJS	vsftpd
Apigility	Git	KVM	PHP	WildFly
Artifactory	GitLab	lighttpd	Postfix	Wireshark
Atomic OS	GlassFish - 9x5 only	Logrotate	PostgreSQL	WordPress
BIND	Gluster / GlusterFS	Logstash (ELK)	Prometheus	Zookeeper
Celiometer	GNU Make	Isof	Puppet	
CentOS	GNU Privacy Guard	MariaDB	PutTY	

Support is available for Community editions only through this offering. Enterprise editions are not supported



More than just Break / Fix



80% of OSS support issues stem from either a lack of product knowledge, or something in the environment outside of the package ¹

80%

IBM Cloud Open Source Support includes diagnostics & virtually unlimited assistance with a wide variety of usage & how-to questions

TSS can be a resource for your development team....at any stage of the SDLC!



Interoperability Issues

- Product compatibility and interoperability questions
- Discuss interdependencies between OSS packages



Installation & Configuration

- Answer specific installation questions for documented functions
- Provide available configuration samples



Short Duration OSS Guidance

- We can provide advice on which OSS packages may be optimized or best suited for your solution



Community Engagement

- Rogue Wave & IBM participate in a wide variety of community projects and leverage as a resource



Our Solution Approach

- Our breadth of expertise allows us to take a holistic approach and provide support for the solution stack
- Review problems from a systems perspective



Additional Resources

- Our team can provide technical references to publications, such as redbooks or manuals and assist with interpretation of publications

¹ 2017 Open Source Support Report, Rogue Wave Software

Why clients choose IBM Technology Support Services



Single Point of Contact

Reduce complexity and consolidate support for any IT infrastructure

- **One call, one contract, one IBM**
- Support for IBM & non-IBM hardware, software & services
- IBM supports over **30,000** different IT devices
- Our extensive support network helps us pinpoint issues and resolve complex problems quickly and effectively



World Class Enterprise Support

Enhance IT availability with a virtually unmatched global infrastructure

- IBM has nearly **19,000** technicians averaging over **14** years experience
- We provide support in **180** countries covering **127** languages
- Our technicians hold key industry certifications
- We offer one of the fastest industry response times and speed to resolution with industry leading NPS



Premium Support Solutions

Extensive, flexible and customizable service options are available

- Proactive & Predictive maintenance options: IBM uses analytics to head off problems before they happen
- Managed support options with named technical focals
- We offer additional security options such as US Citizens support & Data Quarantine



Open Source Software Support

Comprehensive Support Solutions for the Open Source Ecosystem


- Supporting Open Source SW for **18+** years
- **600** developers worldwide
- TSS has a **>99%** Linux fix rate (we engage partners less than 1% of the time for L3 support)
- Our agnostic approach allows us to support all the major Linux & OSS distributions across any platform

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Significant supportables for IBM i


- Git
- Jenkins
- rsync
- Node.js
- Apache Tomcat
- WordPress
- Python
- For more resources, see my blog post: <http://ibmsystemsmag.com/blogs/open-your-i/december-2018/a-game-changer-for-open-source-support/>



Come join the community!!



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Participate in the community!

- How?
 - Ask questions
 - Give advice
 - Share code, tips, tricks, etc!
 - Make code contributions
- Where?
 - Ryver
 - https://ibmiooss.ryver.com/application/signup/members/9tJsXDG7_iSSi1Q
 - <https://ibmiooss.ryver.com>
 - Club Seiden
 - <http://club.seidengroup.com>
 - Midrange “Open Source” thread
 - <http://archive.midrange.com/opensource/>
 - LinkedIn (IBMiOSS group, brand new!)
 - Twitter

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- For the latest news:
 - watch **#IBMiOSS**
 - Follow @IBMJesseG and other community members
- Information or questions, just tweet with #IBMiOSS!

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Spread the word!

- Write or contribute to articles, blogs, etc.
- Speak at user groups and conferences
- Tweet with the #IBMiOSS hashtag!



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Appendix A: Machine Learning examples



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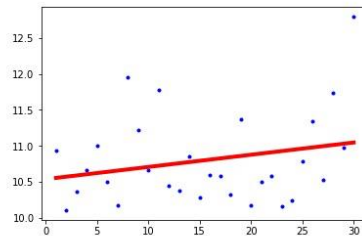


```
In [51]: #implement a linear regression with Scikit-learn.

from sklearn.linear_model import LinearRegression

model = LinearRegression()
model.fit(xdata,ydata)
pred = model.predict(xdata)
#print("expect time:",(-model.intercept_/model.coef_)[0][0])
print("expect days to reach 40% CPU:",((40-model.intercept_)/model.coef_)[0][0])
plt.plot(xdata,ydata,"b.")
plt.plot(xdata,pred,'r',linewidth=4)
plt.show()
```

expect days to reach 40% CPU: 1740.8391



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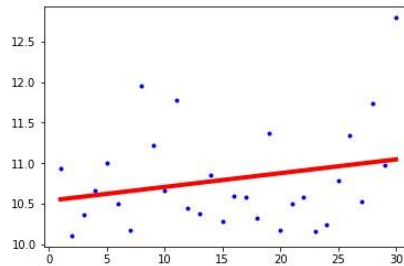
```

In [52]: #implement a linear regression with scipy.
import scipy as sp

(w,b) = sp.polyfit(xdata1d,ydata1d,1)
print("expect days to reach 40% CPU:",(40-b)/w)
plt.plot(xdata1d,ydata1d,"b.")
plt.plot(xdata1d,xdata1d*w+b,'r',linewidth=4)
plt.show()

```

expect days to reach 40% CPU: 1740.838798780761



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More Complex Demo: Credit Default Prediction

- Deep-learning application for loan default prediction
- Developed with **scikit-learn**
- Training on **IBM i or Linux (Snap ML)**, with **inferencing directly on the IBM i**
- Uses **REST API in Node.js** to transfer data between Linux and IBM i
- Front-end web UI for demonstration (written with **Flask**)



- Note: Still finding a landing page for documentation and example source code. If you are interested, e-mail mirish@ibm.com

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Data from a dummy dataset, imported into Db2

MERCHANT	ACCT_STATUS_K_USD	CONTRACT_DURATION_MONTH	HISTORY	CREDIT_PROGRAM	AMOUNT_K_USD	ACCOUNT_TYPE	ACCT_AGE	STATE	IS_URBAN
893	USD		12 CRITICAL ACCOUNT	NEW CAR	2171 up to 100 K USD	1 to 4 YRS	NY	NO	
894	to 200 USD		36 CRITICAL ACCOUNT	USED CAR	1860 up to 100 K USD	1 to 4 YRS	CT	NO	
895	NONE		18 CRITICAL ACCOUNT	ELECTRONICS	1189 UNKNOWN/NONE	1 to 4 YRS	NY	NO	
896	NONE		36 DELAY IN PAST	USED CAR	8947 UNKNOWN/NONE	4 to 7 YRS	CT	NO	
897	USD		21 EXISTING CREDITS PAID BACK	ELECTRONICS	2656 up to 100 K USD	up to 1 YR	NY	NO	
898	NONE		12 CRITICAL ACCOUNT	FURNITURE	1592 above 1000 K USD	4 to 7 YRS	CT	NO	
899	NONE		15 EXISTING CREDITS PAID BACK	FURNITURE	2186 UNKNOWN/NONE	4 to 7 YRS	PA	NO	
900	USD		18 EXISTING CREDITS PAID BACK	FURNITURE	4153 up to 100 K USD	1 to 4 YRS	NJ	NO	
901	USD		16 CRITICAL ACCOUNT	NEW CAR	2625 up to 100 K USD	above 7 YRS	NJ	NO	
902	NONE		20 CRITICAL ACCOUNT	NEW CAR	3485 UNKNOWN/NONE	up to 1 YR	NJ	YES	
903	NONE		36 CRITICAL ACCOUNT	USED CAR	10477 UNKNOWN/NONE	above 7 YRS	NJ	NO	
904	NONE		15 EXISTING CREDITS PAID BACK	ELECTRONICS	1386 UNKNOWN/NONE	1 to 4 YRS	NY	NO	
905	NONE		24 EXISTING CREDITS PAID BACK	ELECTRONICS	1278 up to 100 K USD	above 7 YRS	NY	NO	
906	USD		12 EXISTING CREDITS PAID BACK	ELECTRONICS	1107 up to 100 K USD	1 to 4 YRS	NJ	NO	
907	USD		21 EXISTING CREDITS PAID BACK	NEW CAR	3763 UNKNOWN/NONE	4 to 7 YRS	NJ	NO	
908	to 200 USD		16 EXISTING CREDITS PAID BACK	EDUCATION	3711 UNKNOWN/NONE	1 to 4 YRS	NJ	NO	
909	NONE		15 DELAY IN PAST	USED CAR	3594 up to 100 K USD	up to 1 YR	PA	NO	
910	to 200 USD		18 EXISTING CREDITS PAID BACK	NEW CAR	3385 UNKNOWN/NONE	1 to 4 YRS	PA	NO	
911	NONE		36 DELAY IN PAST	ELECTRONICS	4854 up to 100 K USD	1 to 4 YRS	NY	NO	
912	to 200 USD		24 CRITICAL ACCOUNT	FURNITURE	4736 up to 100 K USD	up to 1 YR	NJ	NO	
913	to 200 USD		30 EXISTING CREDITS PAID BACK	ELECTRONICS	2991 UNKNOWN/NONE	above 7 YRS	NJ	NO	
914	NONE		11 EXISTING CREDITS PAID BACK	RETRAINING	2141 above 1000 K USD	above 7 YRS	PA	YES	
915	USD		24 ALL CREDITS PAID BACK	RETRAINING	3161 up to 100 K USD	1 to 4 YRS	NY	NO	
916	to 200 USD		48 NONE TAKEN	OTHER	1844 up to 100 K USD	1 to 4 YRS	PA	NO	
917	NONE		30 EXISTING CREDITS PAID BACK	USED CAR	2648 100 to 500 K USD	1 to 4 YRS	PA	NO	
918	USD		6 EXISTING CREDITS PAID BACK	NEW CAR	1486 up to 100 K USD	above 7 YRS	PA	NO	
919	USD		24 EXISTING CREDITS PAID BACK	FURNITURE	2389 100 to 500 K USD	TBD	PA	YES	
920	USD		24 EXISTING CREDITS PAID BACK	FURNITURE	3345 up to 100 K USD	above 7 YRS	NY	NO	
921	NONE		18 CRITICAL ACCOUNT	FURNITURE	1817 up to 100 K USD	1 to 4 YRS	NY	NO	
922	NONE		48 DELAY IN PAST	ELECTRONICS	12749 500 to 1000 K USD	4 to 7 YRS	NY	NO	
923	USD		9 EXISTING CREDITS PAID BACK	ELECTRONICS	1366 up to 100 K USD	up to 1 YR	CT	NO	
924	to 200 USD		9 EXISTING CREDITS PAID BACK	NEW CAR	2002 up to 100 K USD	4 to 7 YRS	CT	NO	
925	USD		24 ALL CREDITS PAID BACK	FURNITURE	6872 up to 100 K USD	up to 1 YR	NJ	YES	
926	USD		12 ALL CREDITS PAID BACK	FURNITURE	697 up to 100 K USD	up to 1 YR	NY	NO	
927	USD		18 CRITICAL ACCOUNT	FURNITURE	1049 up to 100 K USD	up to 1 YR	NY	NO	
928	USD		18 EXISTING CREDITS PAID BACK	USED CAR	1029 up to 100 K USD	4 to 7 YRS	NY	NO	
929	NONE		30 EXISTING CREDITS PAID BACK	ELECTRONICS	1867 UNKNOWN/NONE	above 7 YRS	NY	NO	
930	USD		12 DELAY IN PAST	NEW CAR	1344 up to 100 K USD	1 to 4 YRS	NY	NO	
931	USD		24 EXISTING CREDITS PAID BACK	FURNITURE	1747 up to 100 K USD	up to 1 YR	NY	NO	
932	to 200 USD		9 EXISTING CREDITS PAID BACK	ELECTRONICS	1670 up to 100 K USD	up to 1 YR	NY	NO	
933	NONE		9 CRITICAL ACCOUNT	NEW CAR	1234 up to 100 K USD	1 to 4 YRS	CT	NO	
934	NONE		12 CRITICAL ACCOUNT	ELECTRONICS	521500 to 1000 K USD	above 7 YRS	NY	NO	

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Training the model on the data...

Have 1000 known credit accounts. Train a model on 900 of them, then test model on the last 100 to determine model accuracy

```

0 = No Default, 1 = Default          Chance of No Default          Chance of
Prediction: 1 Actual: 0 Probability: ( 0.39931058938110997 , 0.60068941061889 )
Prediction: 1 Actual: 1 Probability: ( 0.04396396724667273 , 0.9560360327533273 )
Prediction: 0 Actual: 1 Probability: ( 0.8267071417589261 , 0.17329285824107388 )
Prediction: 0 Actual: 0 Probability: ( 0.9813813065900909 , 0.01861869340990902 )
Prediction: 0 Actual: 0 Probability: ( 0.7665148240541815 , 0.23348517594581847 )
Prediction: 0 Actual: 0 Probability: ( 0.9913802276766168 , 0.008619772323383209 )
Prediction: 0 Actual: 0 Probability: ( 0.747153939982939 , 0.252846060017061 )
Prediction: 0 Actual: 0 Probability: ( 0.996098291035753 , 0.003901708964246974 )
Prediction: 0 Actual: 1 Probability: ( 0.5766529003502558 , 0.4233470996497442 )
Prediction: 1 Actual: 0 Probability: ( 0.4769135583636863 , 0.5230864416363137 )
Prediction: 1 Actual: 0 Probability: ( 0.2410664026582301 , 0.7589335973417699 )
Prediction: 0 Actual: 0 Probability: ( 0.6893280492796938 , 0.3106719507203061 )
Prediction: 0 Actual: 0 Probability: ( 0.9750926365935764 , 0.024907363406423657 )
Prediction: 0 Actual: 0 Probability: ( 0.7656012828390749 , 0.24349871716092514 )
Prediction: 1 Actual: 0 Probability: ( 0.15274769798760635 , 0.8472523020123937 )
Prediction: 0 Actual: 1 Probability: ( 0.9805121676881574 , 0.019487832311842587 )
Prediction: 1 Actual: 1 Probability: ( 0.1434059901966399 , 0.8565940098033601 )
Prediction: 1 Actual: 1 Probability: ( 0.14677280883158828 , 0.8532271911684117 )
Prediction: 0 Actual: 0 Probability: ( 0.9774938908491175 , 0.022506109150882463 )
Accuracy of Neural Network classifier on test set: 0.69
    
```

What number of the 100 known accounts did the model correctly predict?

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Import model to IBM i, inference from Db2...

```
def main():
    # connect to Db2 and get the data
    conn = db2.connect()
    cur = conn.cursor()
    cur.execute('select * from www.tbl_cust')

    rows = []

    # TODO: This is to convert to json, model help with transferring data because we could reuse
    class CursorByItem():
        def __init__(self, cursor):
            self.cursor = cursor

        def __iter__(self):
            return self

        def __next__(self):
            row = self.cursor.__next__()
            return (description[i] row[col] for col, description in enumerate(self.cursor.description))

    for row in CursorByItem(cur):
        rows.append(row)

    json_data = json.dumps(rows)

    model_path = "/default/prediction_model.pkl"
    preproc_path = "/feature_transform_model.pkl"
    model_sc = scaler = load_model(model_path, preproc_path)
    processed_data = process_file(json_data, model_sc)
    predict_defaults(model, processed_data, rows)
```

Connect to Db2 to get data into Python, import the model, then inference on data with unknown outcomes.

```
-bash-4.4$ python predict.py
Gold Acoustics      Not likely to default ( 0.013 )
Wood Corp          Likely to default ( 0.8644 )
Bridge Acoustics   Not likely to default ( 0.013 )
Rabbitechnologies Might default ( 0.2911 )
Vidiotainment      Not likely to default ( 0.1454 )
Voyagefonics       Not likely to default ( 0.04 )
Webrows            Not likely to default ( 0.0476 )
Silverman          Not likely to default ( 0.0081 )
Radware            Not likely to default ( 0.1178 )
Leopardworth       Not likely to default ( 0.0225 )
Five Network       Likely to default ( 0.6415 )
Storm Records      Not likely to default ( 0.0054 )
Patrol Sports      Not likely to default ( 0.247 )
Blisnightelligence Not likely to default ( 0.0315 )
Pumpkinavigation   Not likely to default ( 0.1053 )
Comics             Not likely to default ( 0.0021 )
Shadowworks        Not likely to default ( 0.0473 )
Squidmart          Not likely to default ( 0.0699 )
Vandercross        Not likely to default ( 0.0287 )
Arcomson           Likely to default ( 0.6812 )
Turtle Enterprises Might default ( 0.5432 )
Goblin Acoustics   Might default ( 0.2554 )
Frostfire Media    Not likely to default ( 0.084 )
Phenomenologies    Not likely to default ( 0.1106 )
Playtrens          Not likely to default ( 0.1683 )
Aces               Not likely to default ( 0.0297 )
Pharmasecurity     Not likely to default ( 0.1728 )
Sulksshade         Likely to default ( 0.46 )
Soulbeat           Not likely to default ( 0.1711 )
Bamsheavys         Not likely to default ( 0.1485 )
Oyster Co.         Not likely to default ( 0.681 )
Soulj              Not likely to default ( 0.1261 )
Wave Acoustics     Not likely to default ( 0.0721 )
Spectertainment    Not likely to default ( 0.1118 )
```

For each entry in the database, run against the model and print (and color) the output

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... or from data entered in a web form!

Model Training

Take data with a known outcomes and train a predictive model that determines how outcomes covary with other data. For this example, the data is credit account information, such as income, size of loan, and credit history, and the outcome is whether the account defaulted.

Train from Db2 data

Uses data from local Db2 table to train a model in scikit-learn locally.

Use pre-built model

Use a model that was previously built, either on the IBM i or from other hardware such as GPU-accelerated training on Linux or AIX.

Inferencing

New data can be run against the trained model, offering new and interesting insights that can be used in real business cases. In this example, enter data for a person seeking credit, and the model will attempt to determine whether they will default on their loan.

Inference on new data

Account balance in thousands of USD
Choose...

Contract Duration in Months
CONTRACT_DURATION_MONTH

Credit History
Choose...

Credit Program
Choose...

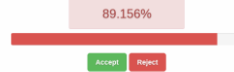
Amount in thousands of USD
AMOUNT_K_USD

Account Type
Choose...

Account Age
Choose...

Present Residents

Chance to Default





Demos-ibm_db_dbi

```

In [1]: import ibm_db_dbi as dbi
import argparse
import sys

sqlcmd = "select pid,score from qmdemo.fltr where ppid=12782"
print("sqlcmd="+sqlcmd)
try:
    conn = dbi.connect()
    cur = conn.cursor()
    cur.execute(sqlcmd)
    if cur._result_set_produced:
        rlist = cur.fetchall()
        for onerecord in rlist:
            print(onerecord)
    conn.commit()
except Exception as err:
    print("ERROR: " + str(err))

sqlcmd="select pid,score from qmdemo.fltr where ppid=12782
(17685, -1)
(17687, 1)

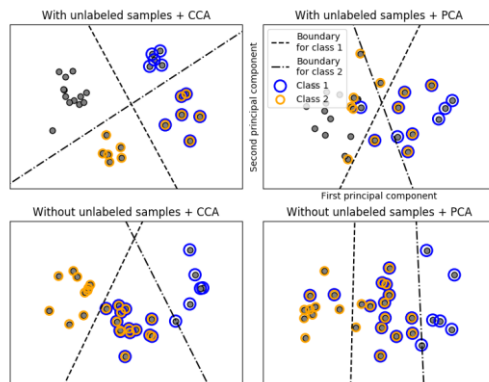
```

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Demo-scikit-learn

- multi-label classification.
 - Each sample has 20 features
 - We try to use Support Vector Machine (SVM) based on the chosen features (2 features selected) by canonical correlation analysis (CCA) or principal component analysis (PCA), which make it easier for us to show on plot.

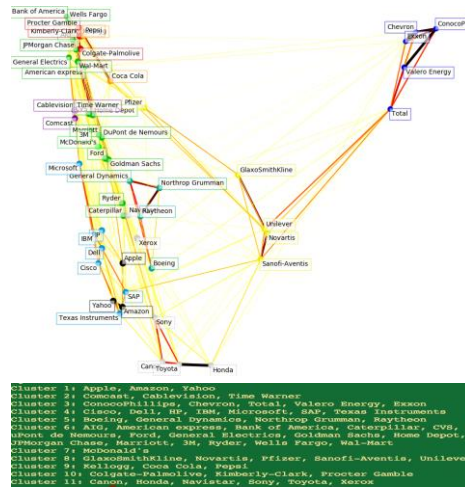


refs: https://scikit-learn.org/stable/auto_examples/plot_multilabel.html#sphx-glr-auto-examples-plot-multilabel-py



Demo-scikit-learn

- visualizing the stock market structure.
 - try to get the stock open/close prices for some companies as training data.
 - Using the GraphLassoCV to train the data.
 - Using the trained model's covariance matrix to calculate the classes and labels.
 - Giving out the clusters output based on assigned labels.
 - Meanwhile, visualizing the results into a 2d plane.



refs: https://scikit-learn.org/stable/auto_examples/applications/plot_stock_market.html#sphx-glr-auto-examples-applications-plot-stock-market-py

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Demo-scikit-learn

- faces recognition
 - Using LFW(Labeled Faces in the Wild)
 - PCA is used to reduce the features of training images
 - SVM is used to do te classification.
 - GridSearchCV is used to do the search for best hyper-params.
 - Use some some utilities to show the prediction result.



```

--classification_report--
precision    recall  f1-score   support

 Ariel Sharon    0.60    0.46    0.52     13
  Colin Powell  0.80    0.87    0.83     60
 Donald Rumsfeld 0.94    0.63    0.76     27
  George W. Bush 0.83    0.98    0.90    146
 Gerhard Schroeder 0.95    0.80    0.87     25
  Hugo Chavez   1.00    0.47    0.64     15
   Tony Blair   1.00    0.78    0.88     36

 avg / total    0.86    0.85    0.84    322
    
```

```

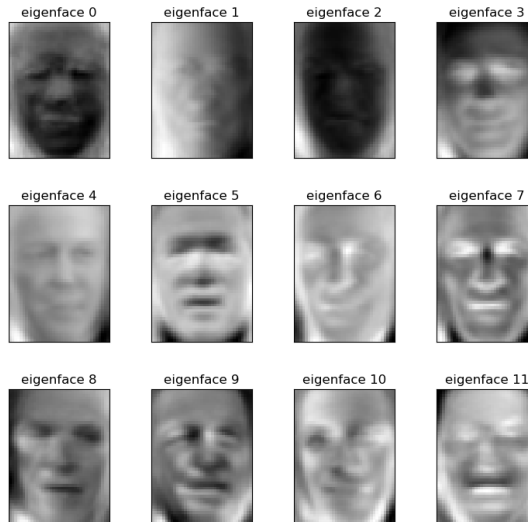
--confusion_matrix--
[[ 6  2  0  5  0  0  0]
 [ 2 52  0  6  0  0  0]
 [ 1  2 17  7  0  0  0]
 [ 0  3  0 143  0  0  0]
 [ 0  1  0  4 20  0  0]
 [ 0  4  0  3  1  7  0]
 [ 1  1  1  5  0  0 28]]
    
```

refs: https://scikit-learn.org/stable/auto_examples/applications/plot_face_recognition.html#sphx-glr-auto-examples-applications-plot-face-recognition-py

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eigenfaces



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Lots more capabilities

- https://scikit-learn.org/stable/auto_examples/index.html
- Go explore!

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Demo – Basic Node.js CRUD application

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Closing Thoughts



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IBM i Open Source Architect

- Open source is an integral part of IBM i strategy
- Architect for open source:
Jesse Gorzinski
- Read his "Open Your i" blog at
<http://ibm.biz/open-your-i>

IBM Systems
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Blog

Open Your i

Jesse Gorzinski

See All Posts

A Tale of Two Web Servers

It was the best of times, it was the first of times. At least, it was the first time I announced a new open source delivery in a COMMON session! In a crowded room in Orlando, I declared a fresh addition to 5733-OPS: the nginx web server, to be delivered into option 11 of the product.

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Posted: May 23, 2017 | 0 Comments

Why Contribute Code to the Open-Source Community?

The benefits of using open-source technologies are easy to see. Open source software helps you create and deliver solutions

Recent Posts

A Tale of Two Web Servers
05/23/2017

Why Contribute Code to the Open-Source Community?
04/22/2017

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Major Themes of the Open Source Revolution

- Explosion of languages
 - C/C++
 - RPG
 - CL
 - Cobol
 - Perl
 - Ublu
 - Kotlin
 - Lua
 - Python
 - PHP
 - bash
 - Ruby
 - JavaScript (Node.js)



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Major Themes of the Open Source Revolution

- “Normalization” of IBM i Application Development
 - Familiar tools
 - Industry-standard technology
 - Industry-standard techniques
- More tools available
- More frameworks and configurations
- More solutions
- Unprecedented capabilities
- What can it do for you?



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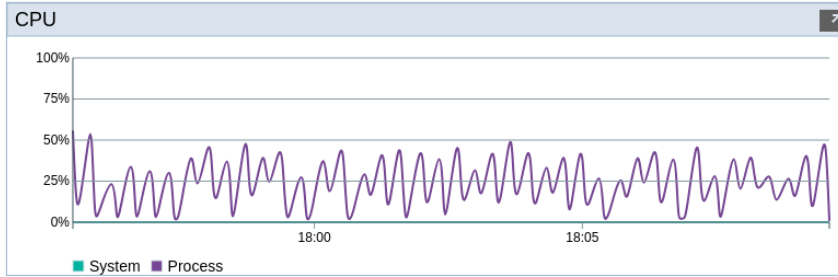
The end!



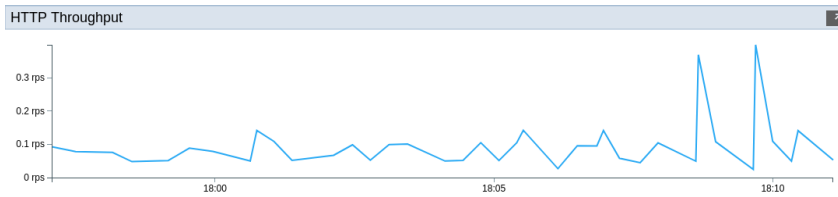
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AppMetrics



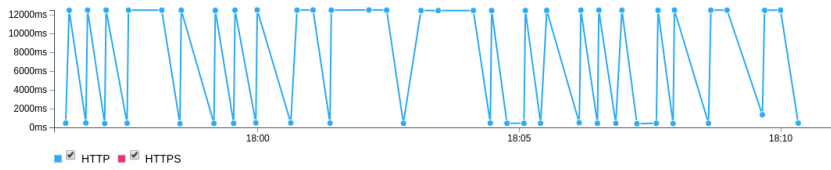
AppMetrics





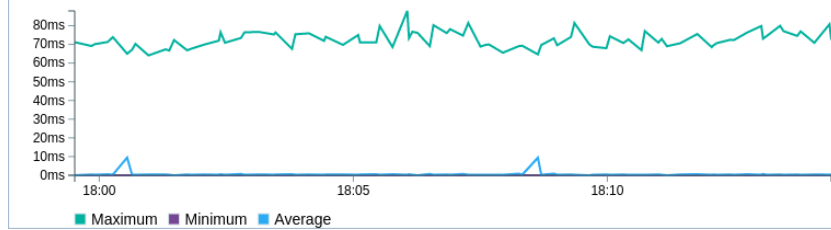
AppMetrics

HTTP Incoming Requests



AppMetrics

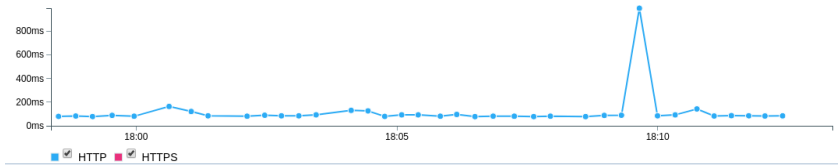
Loop Times





AppMetrics

HTTP Outbound Requests



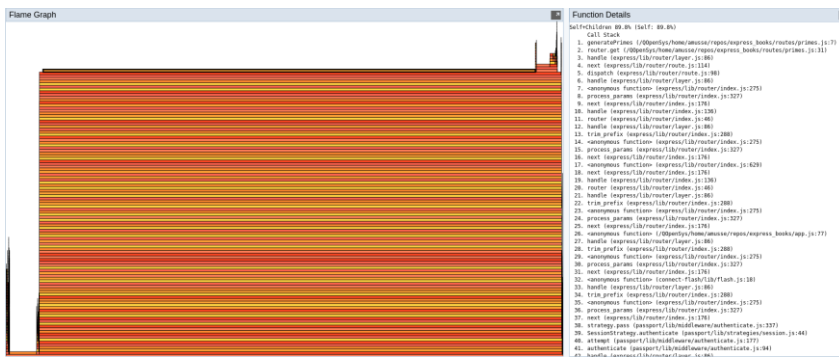
AppMetrics

Heap

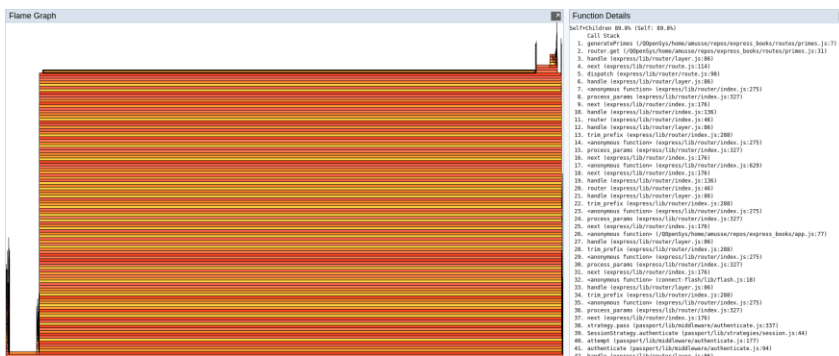




AppMetrics



AppMetrics





A “Happy” Ending



A “Hapi” Ending

The year.... 2013.....



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Walmart creates a framework!

- Express.js appeared in 2009.
- Walmart saw Express.js insufficient for very large projects, but saw the huge potential in Node.js.
- Willing to invest millions of dollars in a new framework.
- <https://garage.socialista.at/2016/12/enterprise-level-backend-framework-from-walmart>



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Black Friday 2013

- Full deployment for all mobile shopping!!
- The hardware?
 - 10 CPU cores
 - 28 GB memory



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