World of Open Source on IBM i

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Agenda

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

IBM i Marketplace Survey (HelpSystems)

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

- Security: 66%
- High availability/ disaster recovery: 57%
- Modernizing applications: 50%
- IBM i skills: 49%
- Data growth: 31%
- Analytics/ business intelligence: 20%
- Reducing IT spending: 29%
- Compliance and regulations: 27%
- Mobility: 26%
- Migrating applications to the cloud: 18%
- Capacity planning: 14%
- Enterprise systems management tools and SLAs: 12%
- Other: 3%

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

Security: 69%
High availability/disaster recovery: 57%
Modernizing applications: 50%
IBM i skills: 49%
Data growth: 31%
Analytics/business intelligence: 30%


https://www.ibm.com/case-studies/c223622o41231s41
Deknudt Frames

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

• “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.”
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

“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.”

“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
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."

"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

Happy 30th Anniversary!

At IBM, we value and appreciate your trust in running your business on IBM. We are inspired by how IBM clients in 137 countries are creating innovative solutions and enhancing the lives of the people.

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 platform to new and innovative ways.

Thank you.

Adam Rief
IBI Client Manager
Shane Albright
IBM - 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

Svenska Handelsbanken AB
Sharing all the customer success on IBM
Read the customer story

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

IBM i 30th Anniversary Customer Stories – CONTINUED!!

- Geodis: Node.js
- RPC Superfos: Python, Node.js
- King Ill 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
Customer stories

• “Three Ways Open Source Brings Business Value”

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

5733-OPS Roadmap
5733-OPS Roadmap
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)

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.
Demo – Installing Open Source for the first time!

# of Open Source Packages
Open Source on i: timeline

- 1998: JTOpen
- 2002: Apache
- 2006: Zend PHP
- 2013: PowerRuby
- 2014: 5733-OPS Node.js
- 2015: 5733-OPS Python
- 2016: 5733-OPS "Tools"
- 2017: 5733-OPS Nginx
- 2018: RPM's
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
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
Demo – Installing needed packages

- To pull demo from BitBucket:
  - git

- To build native code
  - gcc packages
  - libstdc++plusplus-devel
  - make-gnu

- To run the demo
  - nodejs10
What is IBM i doing? Languages

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
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/ruby/ibm/)
  - 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
Python

• What’s Python?
  – A powerful general-purpose language
  – Interpreted

• Why Python?
  – Easy to use
    o Language is designed to be a “fun” language
    o Can be considered the ‘CL language for the modern programmer’
    o Easy for IBM i programmers to learn
  – Very, very popular
    o Over 130,000 third-party extensions are available on http://pypi.org

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

Some numbers

125,000 Python modules

  – Python Package Index (pypi.python.org)
Some numbers

700,000 Node.js packages
  - Npmjs.com

What is IBM i doing?
Integration
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

---

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
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.NETSTAT_INFO
ORDER BY BYTES_SENT_REMOTELY + BYTES_RECEIVED_LOCALLY DESC LIMIT 10;
```

<table>
<thead>
<tr>
<th>BYTES_SENT_REMOTELY</th>
<th>BYTES_RECEIVED_LOCALLY</th>
<th>LOCAL_ADDRESS</th>
<th>LOCAL_PORT</th>
<th>REMOTE_ADDRESS</th>
<th>REMOTE_PORT</th>
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<td>48400</td>
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<td>95188</td>
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<td>8475.977.154.79</td>
<td>59569</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54175</td>
<td>399195.38.187</td>
<td>446.977.154.79</td>
<td>59565</td>
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<td></td>
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<td>59146</td>
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<td>23.977.154.79</td>
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<tr>
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<td>128485.0.0.0</td>
<td>128485.0.0.0</td>
<td>59530</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IBM i Services - Examples

-- Description: Show me disk units and how full they are

```
SELECT ASP_NUMBER, UNITNBR, PERCENT_USED
FROM QSYS2.SYSDISKSTAT;
```

<table>
<thead>
<tr>
<th>ASP_NUMBER</th>
<th>UNITNBR</th>
<th>PERCENT_USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>30.062</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>28.535</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>28.531</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>28.529</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>28.529</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>28.537</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>28.529</td>
</tr>
</tbody>
</table>
What is IBM i doing?
User and Developer Tools

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
Demo – cloning and building project

Developer access to IBM i
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

Some of the Latest News
.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

Easy install with yum!

```
-bash-4.4$ yum list mono
Available Packages
mono-complete.ppc64  5.21.0.530-0
mono-core.ppc64      5.21.0.530-0
mono-data.ppc64      5.21.0.530-0
mono-data-db2.ppc64  5.21.0.530-0
mono-data-oracle.ppc64 5.21.0.530-0
mono-data-sqlite.ppc64 5.21.0.530-0
mono-devel.ppc64     5.21.0.530-0
mono-extras.ppc64    5.21.0.530-0
mono-mvc.ppc64       5.21.0.530-0
mono-lexer.ppc64     5.21.0.530-0
mono-reactive.ppc64  5.21.0.530-0
mono-wcf.ppc64       5.21.0.530-0
mono-web.ppc64       5.21.0.530-0
mono-winform.ppc64   5.21.0.530-0
mono-winxcore.ppc64  5.21.0.530-0
monadoc-core.ppc64   5.21.0.530-0
```
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
Python
IBM PowerAI Enterprise Platform

Enterprise-Grade AI Software, Optimized for Power

Deep Learning Frameworks & Enhancements
- TensorFlow
- Caffe
- IBM Caffe
- Watson APIs

Supporting Capabilities and Libraries
- Distributed Frameworks
- AI Vision Runtime
- OpenBLAS
- Bazel
- NVIDIA DIGITS
- NCCL
- IBM Spectrum Conductor

IBM Services and Support
- IBM Entire Stack Support
- IBM Power AI Research
- IBM Education & Certification
- IBM Optimization and Testing

IBM Power Accelerated Servers: Ideal for Enterprise AI Workloads
- IBM Power AC922
- Acceleration for the AI era
- Designed for Enterprise Grade
- POWER Performance

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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
- VirtualData News
- Tradeoff Analytics

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Side-by-side

<table>
<thead>
<tr>
<th>IBM Watson</th>
<th>IBM PowerAI</th>
<th>Python Libraries</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-prem or cloud?</td>
<td>Cloud</td>
<td>Either</td>
</tr>
<tr>
<td>Performance</td>
<td>Great</td>
<td>Blazing</td>
</tr>
<tr>
<td>Cost</td>
<td>Pay-as-you-go</td>
<td>Contact your IBM Rep.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
</tr>
<tr>
<td>Db2 data access (best case)</td>
<td>Upload your data, or connect to cloud via API's</td>
<td>Connect to data from PowerAI</td>
</tr>
<tr>
<td>Available software packages</td>
<td>IBM Watson API set</td>
<td>Virtually all the major popular frameworks, including tensorflow, caffe, etc.</td>
</tr>
<tr>
<td>Hardware Stack</td>
<td>Built for AI and ML</td>
<td>Built for AI and ML</td>
</tr>
</tbody>
</table>
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**
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
- Apache HttpServer
- MariaDB
- MongoDB
- MySQL
- PostgreSQL
- RabbitMQ
- Tomcat
- NGINX
- WordPress
- SugarCRM
- Docker
- Kube
- Red Hat CephFS
- Kibana
- Cassandra
- Ceph
- CouchDB
- Chef
- Puppet
- Jenkins
- OpenJDK
- Elasticsearch
- Logstash
- Kafka
- OpenLDAP
- OpenSSL
- Zookeeper
- Nagios
- PHP

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

<table>
<thead>
<tr>
<th>Supported Products List</th>
</tr>
</thead>
<tbody>
<tr>
<td>389DirectoryServer</td>
</tr>
<tr>
<td>ActiveMQ</td>
</tr>
<tr>
<td>Ansible</td>
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<tr>
<td>Apache Ant</td>
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<td>Apache Camel</td>
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<tr>
<td>Apache Cassandra</td>
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<td>Apache CouchDB</td>
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<tr>
<td>Apache Derby</td>
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<tr>
<td>Apache HttpServer</td>
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<td>Apache Maven</td>
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<td>Apache ServiceMix</td>
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<tr>
<td>Apache Solr</td>
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<td>Apache Spark</td>
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<tr>
<td>Apache Tomcat</td>
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<td>ApacheXCF</td>
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<td>Atomic OS</td>
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<td>BIND</td>
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<td>Celerimeter</td>
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<td>CephFS</td>
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<td>Chef</td>
</tr>
<tr>
<td>CoreOS</td>
</tr>
<tr>
<td>Couchbase</td>
</tr>
<tr>
<td>CVS: Concurrent Versions System</td>
</tr>
<tr>
<td>Debian - x86 &amp; Power only</td>
</tr>
<tr>
<td>DHCP (ISC DHCP)</td>
</tr>
<tr>
<td>Docker Engine</td>
</tr>
<tr>
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<td>Docker Swarm</td>
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<td>Elasticsearch (ELK)</td>
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<td>GitLab</td>
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<td>Glassfish - 9x only</td>
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<td>WordPress</td>
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<tr>
<td>Zookeeper</td>
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</table>

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

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

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

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

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

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

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

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

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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

---

Significant supportables for IBM

- 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/

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Come join the community!!

Participate in the community!

- How?
  - Ask questions
  - Give advice
  - Share code, tips, tricks, etc!
  - Make code contributions
- Where?
  - Ryver
    - https://ibmioss.ryver.com/application/signup/members/9tJsXDG7_iSSi1Q
    - https://ibmioss.ryver.com
  - Club Seiden
    - http://club.seidengroup.com
  - Midrange “Open Source” thread
  - LinkedIn (IBMiOSS group, brand new!)
  - Twitter
• For the latest news:
  – watch #IBMIOSS
  – Follow @IBMJesseG and other community members

• Information or questions, just tweet with #IBMIOSS!

Spread the word!

• Write or contribute to articles, blogs, etc.

• Speak at user groups and conferences

• Tweet with the #IBMIOSS hashtag!
Appendix A: Machine Learning examples

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', (1-model.intercept_/model.coef_)[0][0])
    print('expect days to reach 40% CPU', (40-model.intercept_/model.coef_)[0][0])
    plt.plot(xdata, ydata, 'bo')
    plt.plot(xdata, pred, 'r-', linewidth=4)
    plt.show()

    expect days to reach 40% CPU: 1740.8391
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 **inference 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**
Data from a dummy dataset, imported into Db2

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

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Actual</th>
<th>Probability</th>
<th>Chance of No Default</th>
<th>Chance of Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prediction 1</td>
<td>Actual: 0</td>
<td>Probability: 0.8499296972466279</td>
<td>0.608899406158489</td>
<td>0.490302373431511</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 1</td>
<td>Probability: 0.2907141589261</td>
<td>0.17329658524017388</td>
<td>0.826707141589261</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.9183109859090909</td>
<td>0.18168940909090909</td>
<td>0.8183109859090909</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.7659184280418915</td>
<td>0.234817595810848</td>
<td>0.7659184280418915</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.9183109859090909</td>
<td>0.18168940909090909</td>
<td>0.9183109859090909</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.5166509070907091</td>
<td>0.4833490929092909</td>
<td>0.5166509070907091</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.66009829160753</td>
<td>0.33990170839246675</td>
<td>0.66009829160753</td>
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<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.7659184280418915</td>
<td>0.234817595810848</td>
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<td>0.18168940909090909</td>
<td>0.9183109859090909</td>
</tr>
<tr>
<td>Prediction 0</td>
<td>Actual: 0</td>
<td>Probability: 0.35164056937005</td>
<td>0.64835943062995</td>
<td>0.35164056937005</td>
</tr>
</tbody>
</table>

What number of the 100 known accounts did the model correctly predict?
Import model to IBM i, inference from Db2...

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

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

... or from data entered in a web form!
Demos-ibm_db_dbi

```
In [1]: import ibm_db_db_dbi as dbi
   ...: import argparse
   ...:
   ...: sqlcmd = "select pid, score from gpdemo.flt where ppid=12792"
   ...: print(sqlcmd)
   ...:
   ...: try:
   ...:     conn = dbi.connect()
   ...:     cur = conn.cursor()
   ...:     if cur.zend_uset_procedure():
   ...:         for row in cur.fetchall():
   ...:             print(row)
   ...: except Exception as e:
   ...:     print("ERROR: %s" % e)
   ...: sqlcmd = "select pid, score from gpdemo.flt where ppid=12792"
   ...: try:
   ...:     conn = dbi.connect()
   ...:     cur = conn.cursor()
   ...:     if cur.zend_uset_procedure():
   ...:         for row in cur.fetchall():
   ...:             print(row)
   ...: except Exception as e:
   ...:     print("ERROR: %s" % e)
```

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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

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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.


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 the classification.
  - GridSearchCV is used to do the search for best hyper-params.
  - Use some utilities to show the prediction result.

---classification_report--- | precision | recall | f1-score | support |
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Ariel Sharon</td>
<td>0.60</td>
<td>0.46</td>
<td>0.52</td>
</tr>
<tr>
<td>Colin Powell</td>
<td>0.80</td>
<td>0.87</td>
<td>0.83</td>
</tr>
<tr>
<td>Donald Trump</td>
<td>0.94</td>
<td>0.83</td>
<td>0.87</td>
</tr>
<tr>
<td>George W Bush</td>
<td>0.85</td>
<td>0.93</td>
<td>0.90</td>
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<td>Gerhard Schröder</td>
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<td>0.80</td>
<td>0.87</td>
</tr>
<tr>
<td>Hugo Chávez</td>
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<td>0.47</td>
<td>0.64</td>
</tr>
<tr>
<td>Tony Blair</td>
<td>1.00</td>
<td>0.78</td>
<td>0.88</td>
</tr>
<tr>
<td>avg / total</td>
<td>0.86</td>
<td>0.83</td>
<td>0.84</td>
</tr>
</tbody>
</table>

---confusion_Matrix---

Lots more capabilities


- Go explore!
Demo – Basic Node.js CRUD application

Closing Thoughts
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

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)
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?

The end!
A “Happy” Ending

A “Hapi” Ending
The year…. 2013…..

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.socialisten.at/2016/12/enterprise-level-backend-framework-from-walmart](https://garage.socialisten.at/2016/12/enterprise-level-backend-framework-from-walmart)
Black Friday 2013

- Full deployment for all mobile shopping!!

- The hardware?
  - 10 CPU cores
  - 28 GB memory

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