(AIX) Open Source News
27.06.2017, AIX User Group Meeting Ehningen
Dr. Michael Perzl (mperzl@de.ibm.com)
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Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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Please note:
- The opinions given in this presentation are my own and do not necessarily represent IBM’s position.

PS: I still like my job...
Agenda

- Linux open source news
- Current open source software availability for AIX
- New IBM cloud initiative
- My personal repository: http://www.perzl.org/aix
- RPM dependency hell
- YUM on AIX
- Recent security vulnerability of Samba – “SambaCry“
Linux open source news
POWER8 Open Source Database Price – Performance Guarantee (1/2)

http://www-03.ibm.com/systems/power/solutions/data-platform/mongodb.html

**Special offer:** Get a 2x price-performance advantage guarantee on big data servers for MongoDB

<table>
<thead>
<tr>
<th>Speed up results</th>
<th>Optimize efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>40% more performance per server</td>
<td>2x price-performance guarantee</td>
</tr>
</tbody>
</table>

The combination of MongoDB and POWER8 provides 40% more performance per server than Intel Xeon.*

MongoDB on POWER8 delivers a 2x price-performance advantage than x86.**
Special offer: Get a 1.8x price-performance advantage guarantee on big data servers for EDB Postgres

Performance

2.1x
per core performance

Gain 2 times higher performance per core over Intel based systems for OLTP applications due to high performance multi-threading, more cache and greater data bandwidth.

Efficiency

50%
lower hardware and solution costs

Reduce your maintenance costs by 50 percent, freeing budget space for innovation. More than 50 percent of new in-house applications will be developed on an OSDBMS by 2018.

Hortonworks HDP running on POWER8 Price-Performance Guarantee

Hortonworks Data Platform on IBM Power Systems:

IBM Power Systems guarantees the Power S822LC for Big Data system built with POWER8 delivers at least a 3X price-performance advantage vs. x86 based results when running a customer application/workload with Tez/Hive LLAP on Hortonworks HDP under the conditions noted below. A Worker Node is a server carrying out the HDP query functions, with one Worker Node per server.

3X price-performance means that the customer’s documented throughput performance on the cluster of S822LC for Big Data Worker Nodes divided by the price of the cluster of Worker Nodes will be at least 3 times higher than the customer’s documented throughput performance on the cluster of x86 based Worker Nodes divided by the price of the cluster of x86 Worker Nodes.

**EX:** If queries per second on the cluster of S822LC Worker Nodes are 30,000 and 10,000 on the cluster of x86 based Worker Nodes, while the price of the S822LC Worker Node cluster is $10,000, and the price of the x86 based Worker Node cluster is $10,000, then the Throughput Performance Per Price would be exactly 3 times higher and the guarantee would be met.”
Current open source software availability for AIX
Open source repositories for AIX

- AIX Toolbox for Linux Applications
  - URL: http://www-03.ibm.com/systems/power/software/aix/linux/

- Bull's continued version of the AIX Toolbox for Linux Applications
  - URL: http://www.bullfreeware.com/aixtoolbox/

- Bull open source software archive for AIX
  - URL: http://www.bullfreeware.com/

- Michael Felt’s “AIXTOOLS – Open Source Toolbox for AIX”
  - Collection of open source and GNU software packages built for AIX 5.3 TL7 and higher systems
  - Packages provided in installp BFF format rather than as RPM
  - URL: http://aixtools.net/

- My web site http://www.perzl.org/aix (more later on)
New IBM cloud initiative
Open source cloud automation and configuration tooling for AIX
IBM expanded commitment to keep key packages updated and provide timely security fixes – enabling clients to leverage open source skills

Cloud Automation

**chef** automation for configuration, deployment, and management. Chef-client for AIX is now enhanced with new recipes in the AIX cookbook.
[https://supermarket.chef.io/cookbooks/aix/](https://supermarket.chef.io/cookbooks/aix/)

**yum** package management now available, with repository access from both ftp and https protocols. rpm is also updated to allow automatic dependency discovery.
New ability to automate installation and updates.

**cloud-init** and all dependencies now available in the repository, and support for licensed AIX users.
Easy virtual machine customization for the cloud.

Development Packages and Utilities
Languages, Compiler, debugger, etc.

Open source package repository for AIX
80+ packages updated this year

**github** community to create and collaborate on open source projects for AIX
[http://github.org/aixoss](http://github.org/aixoss)

**node.js** popular event driven Javascript, optimized for Power Systems on AIX
AIX Open Source Automation

- Open source tooling on AIX to leverage Linux industry skills
- IBM will port, keep current and provide timely security fixes
- IBM Facilitated Community Projects

<table>
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<tr>
<th>Automation</th>
<th>Development Packages: Languages, compiler, debugger</th>
<th>Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>chef-client Install, Patching</td>
<td>GCC</td>
<td>OpenSSH</td>
</tr>
<tr>
<td>and Config Automation</td>
<td>GDB</td>
<td>OpenSSL</td>
</tr>
<tr>
<td></td>
<td>Python</td>
<td>CUPS</td>
</tr>
<tr>
<td>yum Install, Repository Automation</td>
<td>Perl</td>
<td>Apache HTTPD</td>
</tr>
<tr>
<td></td>
<td>Ruby</td>
<td>Samba (SMB)</td>
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<tr>
<td></td>
<td>PHP</td>
<td>PTPD</td>
</tr>
<tr>
<td></td>
<td>Node.JS</td>
<td>Bash (shell)</td>
</tr>
<tr>
<td>Cloudinit Virtual Machine</td>
<td>Core GNU utilities (coreutils, grep, diffutils, gzip, findutils, etc)</td>
<td>RPM (package installer)</td>
</tr>
<tr>
<td>Customization</td>
<td>Core build utilities (autoconf, automake, make, libtool, binutils, etc)</td>
<td>Common Tools: sudo, wget, rsync, tcpdump, vim, emacs, lsol, curl, VNC</td>
</tr>
</tbody>
</table>

Languages, compiler, debugger:
- GCC
- GDB
- Python
- Perl
- Ruby
- PHP
- Node.JS

Core GNU utilities (coreutils, grep, diffutils, gzip, findutils, etc):
- Core GNU utilities (coreutils, grep, diffutils, gzip, findutils, etc)

Core build utilities (autoconf, automake, make, libtool, binutils, etc):
- Core build utilities (autoconf, automake, make, libtool, binutils, etc)
Chef for AIX

The AIX Cookbook contains useful resources for using Chef with AIX systems.
- Available @ Chef Supermarket: [https://supermarket.chef.io/cookbooks/aix](https://supermarket.chef.io/cookbooks/aix)

The cookbook includes content from IBM, BNP Paribas, and
- Nexter Systems and provides the following LWRP capabilities:

**Install Management**
- configure network install manager
- install AIX packages/ update OS levels
- install Open Source packages
- install AIX fixes
- create multibos images
- manage alternate disk installs

**Systems Management**
- manage inittab entries
- change device attributes
- change bootlist settings

**Security**
- change security stanzas

**Network Management**
- manage tcpip services
- manage inetd services

**Performance Tuning**
- change system tunables
- change networking tunables
New AIX Toolbox for Linux Applications Updates (1/2)

Recent updates to key packages of the AIX Toolbox since 03/2016:

- autoconf
- automake
- bash
- binutils
- bzip2
- coreutils
- cups
- curl
- dbus
- deltarpm
- diffutils
- emacs
- expat
- fdupes
- file
- findutils
- fontconfig
- freetype2
- gcc
- gdb
- gettext
- git
- glib2
- gmp
- gnuit
- grep
- gzip
- httpd
- jbigkit
- less
- libmpc
- libpaper
- libpcap
- libpng
- libpthread-stubs
- libtool
- libusb
- libX11
- libXau
- libxcb
- libXdmcp
- libXft
- libxml2
- libXrandr
- libXrender
- libyaml
- logrotate
- lsof
- make
- mpfr
- ncurses
- openssl
- openldap
- pcres
- pcre
- perl
- php
- pixman
- ptpd
- python
- randrproto
- renderproto
- rsync
- ruby
- sqlite
- subversion
- sudo
- tcpdump
- tightvnc
- unzip
- vim
- wget
- xcb-proto
- xz
- yum
- zip
- zlib
New AIX Toolbox for Linux Applications Updates (2/2)

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<tr>
<td>2015</td>
<td>9</td>
</tr>
<tr>
<td>2016</td>
<td>88</td>
</tr>
</tbody>
</table>
AIX Toolbox for Linux Applications Update “problems“ 😊

Recent problem with faulty gzip RPM package from IBM website:

What happened?
- Installation of this faulty RPM will overwrite the /usr/bin/uncompress file with a link pointing to a shell script in /opt/freeware/bin.
- This breaks the AIX boot process – unrecoverable without an outage in Maintenance Mode to repair the damages, or restore a mksysb..
- The damage occurs once someone runs:

```
# bosboot -a
trustchk: /usr/bin/uncompress: Verification of attributes failed: owner group mode size hashvalue signature
bosboot: Boot image is 51228 512 byte blocks.
```

This faulty RPM package has since been withdrawn and replaced with a working version. → Please use version gzip-1.6-2.aix6.1.ppc.rpm instead!
My personal website: 
http://www.perzl.org/aix
My personal AIX open source repository (1/4)

- URL: [http://www.perzl.org/aix/](http://www.perzl.org/aix/)
- Started 12/2005 because I was clearly frustrated with the current situation of the AIX Toolbox for Linux Applications.
- Started out with some packages IBM internally which I decided to make publically available later.
- Original purpose was to serve the prerequisites for Ganglia on Power, later grew enormously.
- Software availability:
  - Currently more than 1000 different packages available
  - Total number of downloadable packages ≥ 26,000
  - Total downloadable volume: 70+ GB of RPM packages
  - Growing constantly… [details are here](#)

- This is the “de-facto” AIX Toolbox now!
My personal AIX open source repository (2/4)

**Goals:**

- Completely replace the AIX Toolbox for Linux Applications
  - What is still missing? 😊
- Stay 100% upgrade-compatible to the AIX Toolbox for Linux Applications
  - Sometimes difficult 😊
- Provide as many open source packages as possible
- Support the following AIX versions
  - AIX5L V5.1
  - AIX5L V5.2
  - AIX5L V5.3
  - AIX 6.1
  - AIX 7.1
  - AIX 7.2
- Use the IBM compilers (C/C++, Fortran) whenever possible, otherwise fall back to GCC
- Always build shared libraries
- Always build libraries for 32-bit and 64-bit
- Use RPM format instead of installp BFF format
My personal AIX open source repository (3/4)

- So far user feedback has been superb!

- **Number #1 ranking on Google (10 years in a row now!)**
  Just enter “aix open source” on Google

- Available download protocols: FTP, HTTP, RSYNC

- I do this strictly in my free time
  - No relation to IBM on purpose (please see next slide)

- If you have a request for a specific package let me know and we’ll see what we can do…
My personal AIX open source repository (4/4)

- [http://www.perzl.org/aix](http://www.perzl.org/aix) runs on an Intel x86_64 VServer (CentOS 6.2)
- Hosted by Strato (German ISP) with 100 GB disk space
- **Unlimited network traffic** (otherwise I could not afford it 😊)
  - I personally pay for the ISP services
- Website uses [PmWiki](http://www.pmwik.org) as CMS (Content Management System)

---

**Personal plea:**

- If this website has been
  - useful to you
  - convinced you to stay on AIX
  - convinced you to buy even more AIX systems
  - etc.

   please let me or IBM know. → Feedback is always highly welcome!
Some download statistics from [http://www.perzl.org/aix](http://www.perzl.org/aix)
## Update Frequency Comparison: AIX Toolbox vs. perzl.org

<table>
<thead>
<tr>
<th>Year</th>
<th>AIX TB</th>
<th>perzl.org</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
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<tr>
<td>2001</td>
<td>23</td>
<td>n/a</td>
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<tr>
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<td>n/a</td>
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<tr>
<td>2003</td>
<td>48</td>
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<tr>
<td>2004</td>
<td>75</td>
<td>n/a</td>
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<tr>
<td>2005</td>
<td>9</td>
<td>n/a</td>
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<td>2006</td>
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<td>467</td>
</tr>
<tr>
<td>2016</td>
<td>88</td>
<td>916</td>
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</tbody>
</table>
RPM dependency hell
Everybody who has installed a couple of RPM packages using rpm itself and not with the help of a dependency resolver like yum ran into the following issue:

- You have downloaded and want to install RPM `aaa.rpm`.
- `aaa.rpm` depends on `bbb.rpm` and `ccc.rpm`.
- `bbb.rpm` depends on `ddd.rpm` and `ccc.rpm` on `eee.rpm` and `fff.rpm`.
- etc.

So you end up circling through all your RPM files and downloading all prerequisite RPM files just to install `aaa.rpm`.

For packages with lots of dependencies this becomes annoying and very time-consuming.

This is where tools like
- `yum` (e.g., Red Hat Linux)
- `zypper` (e.g., SUSE Linux)
- `apt` (e.g., Debian Linux)

help you a lot because they do all the dependency resolution for you.
rpm.rte – the source of lots of problems
rpm.rte – the source of lots of problems (1/4)

- The “rpm.rte” file set is part of every AIX installation

```
root@aix:/> lslpp -L | grep rpm.rte
rpm.rte                   3.0.5.52    C     F     RPM Package Manager
```

- The problem is the old version of RPM that is shipped by default with AIX
  - Version 3.0.5 was released on July 20, 2000!
  - Current version is 4.13.0.1 (released February 16, 2016)

- YUM is based on Python
  - Rather recent version of Python required
  - Dependent on a couple more Python modules
  - YUM needs the RPM Python interface to interact with RPM
  - Minimum level of RPM version 4.4 for YUM required!
rpm.rte – the source of lots of problems (2/4)

- In 03/2016 IBM has made available version 4.9.1.3 of “rpm.rte“
- Download link:
- With that version of RPM building and use of YUM on AIX is possible.

**General problem with every version of rpm.rte:**

- rpm.rte has dependencies on other shared libraries.
- These dependent shared libraries are part of rpm.rte.
- Instead of using local copies of these shared libraries they are located in /opt/freeware/lib (default location for 32-bit open source shared libraries)
- Thus, updating any of those shared libraries may/will lead to problems!
  - This basically prevents updating a list of certain shared libraries.
- The biggest problem is that RPM does not know about this (only the ODM)!
- Updating rpm.rte blindly overwrites any newer version of these libraries!
rpm.rte – the source of lots of problems (3/4)

Problems with rpm.rte version 3.0.5.52:

Shared libraries implicitly part of rpm.rte:
- bzip2 v1.0.5
- gettext v0.10.40
- popt v1.7
- zlib v1.2.3

Updating any of these libraries might cause problems as RPM does not know of their existence as part of rpm.rte!
rpm.rte – the source of lots of problems (4/4)

Problems with rpm.rte version 4.9.1.3:

Shared libraries implicitly part of rpm.rte:
- bzip2 v1.0.5
- db4 v4.8.24
- file-libs v5.12
- gettext v0.10.40
- lua v5.1.5
- nspr v4.9.5
- nss v3.13.2
- nss-util v3.13.2
- nss-softokn v3.13.2
- nss-softokn-freebl v3.13.2
- popt v1.16
- readline v6.1
- sqlite v3.7.15.2
- zlib v1.2.7

Updating any of these libraries might cause problems as RPM does not know of their existence as part of rpm.rte!
YUM on AIX
YUM on AIX – finally available

- IBM has made a recent version of RPM available (V4.9.1.3)
  - This allows building and use of YUM on AIX
- YUM has some dependencies which must be met:
  - curl
  - db
  - gdbm
  - gettext
  - glib2
  - python
  - pycurl
  - python-iniparse
  - python-pycurl
  - python-tools
  - python-urlgrabber
  - readline
  - sqlite
  - yum-metadata-parser

Two ways of using YUM on AIX:
1. The IBM way → not compatible with any other repository!
2. The Perzl way → to be compatible with my and other repositories!
YUM on AIX – how to install – “done the IBM way”

1. Install the rpm.rte with "minimum version" of 4.9.1.3 or greater from:

2. Download and install the rpms from yum_bundle_v1.tar from:
   This bundle contains yum and all of it's dependency rpms.

Please note:
- Please go through README - yum from the following location for a detailed description and known issues of yum on AIX:
  or

Interesting blog about YUM on AIX:
YUM on AIX – “done the IBM way”: use perzl.org as a repository (1/2)

YUM main configuration file: `/opt/freeware/etc/yum/yum.conf`

```
root@aix71:/> cat /opt/freeware/etc/yum/yum.conf
[main]
cachedir=/var/cache/yum
keepcache=1
debuglevel=2
logfile=/var/log/yum.log
exactarch=1
obsoletes=1

[AIX_Toolbox]
name=AIX generic repository
baseurl=ftp://anonymous:anonymous@public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/RPMS/ppc/
enabled=1  \(\leftarrow 0 = \text{disable it !!}\)
gpgcheck=0

[AIX_Toolbox_noarch]
name=AIX noarch repository
baseurl=ftp://anonymous:anonymous@public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/RPMS/noarch/
enabled=1  \(\leftarrow 0 = \text{disable it !!}\)
gpgcheck=0

[AIX_Toolbox_71]
name=AIX 7.1 specific repository
baseurl=ftp://anonymous:anonymous@public.dhe.ibm.com/aix/freeSoftware/aixtoolbox/RPMS/ppc-7.1/
enabled=1  \(\leftarrow 0 = \text{disable it !!}\)
gpgcheck=0
```
YUM on AIX – “done the IBM way”: use perzl.org as a repository (2/2)

**Necessary steps:**

1. Disable the AIX Toolbox repositories → see previous slide
2. Create a “perzl.org“ repo File in `/opt/freeware/etc/yum/repos.d`
   → replace “aix71“ with your AIX version (“51”, “52”, “53”, “61“ or “72“)

```bash
root@aix71:/> cat /opt/freeware/etc/yum/repos.d/perzl-org.repo
[perzl.org_71]
name=perzl.org AIX 7.1
baseurl=ftp://www.oss4aix.org/latest/aix71/
enabled=1
gpgcheck=0
```

- Alternatively you can also download per HTTP:
  → use “baseurl=http://www.oss4aix.org/downloadlatest/aix71/“
YUM on AIX – how to install – “done the Perzl way” (1/4)

- In order to solve all these issues I decided to build YUM and all prerequisites myself against the RPM versions of my repository.
- The only thing still missing is rpm.rte (download from IBM).

**Installation steps:**
- Download rpm.rte.4.9.1.3
- Install rpm.rte.4.9.1.3
- Download my YUM bundle tar file for your AIX version
- Install all RPMs of my YUM bundle tar file
- Fix the Berkeley Database "version mismatch" errors

→ Now everything should work smoothly... 😊
YUM on AIX – how to install – “done the Perzl way” (2/4)

1. Download rpm.rte.4.9.1.3
   - The direct link is:

2. Install rpm.rte.4.9.1.3

   root@aix:/tmp> installp -aXYgd . rpm.rte
   +-----------------------------------------------------------------------------+
   | Pre-installation Verification...                                           |
   +-----------------------------------------------------------------------------+
   Verifying selections...done
   Verifying requisites...done
   Results...
   ......
   +-----------------------------------------------------------------------------+

   Installation Summary
   ---------------------
<table>
<thead>
<tr>
<th>Name</th>
<th>Level</th>
<th>Part</th>
<th>Event</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpm.rte</td>
<td>4.9.1.3</td>
<td>USR</td>
<td>APPLY</td>
<td>SUCCESS</td>
</tr>
<tr>
<td>rpm.rte</td>
<td>4.9.1.3</td>
<td>ROOT</td>
<td>APPLY</td>
<td>SUCCESS</td>
</tr>
</tbody>
</table>
YUM on AIX – how to install – “done the Perzl way” (3/4)

3. Download my YUM bundle tar file for your AIX version
   – from here per FTP: ftp://www.oss4aix.org/bundles/yum-bundles/
   – or here per HTTP: http://www.oss4aix.org/download/bundles/yum-bundles/

4. Install all RPMs of my YUM bundle tar file

    root@aix:/tmp/yum> rpm -Uvh *.rpm --replacepkgs
    Preparing... #.......................................................... [100%]
    1:zlib #................................................................ [  3%]
    2:gettext #................................................................. [  7%]
    ....
    27:python-pycurl #................................................................ [ 93%]
    28:python-urlgrabber #.................................................. [ 97%]
    error: db4 error(-30971) from dbenv->open: DB_VERSION_MISMATCH: Database environment version mismatch
    error: cannot open Packages index using db4 - (-30971)
    error: cannot open Packages database in /opt/freeware/packages
    error: db4 error(-30971) from dbenv->open: DB_VERSION_MISMATCH: Database environment version mismatch
    error: cannot open Packages database in /opt/freeware/packages
    error: db4 error(-30971) from dbenv->open: DB_VERSION_MISMATCH: Database environment version mismatch
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    error: cannot open Packages database in /opt/freeware/packages
    error: db4 error(-30971) from dbenv->open: DB_VERSION_MISMATCH: Database environment version mismatch
    error: cannot open Packages database in /opt/freeware/packages
    error: cannot open Packages database in /opt/freeware/packages
    29:yum #................................................................ [100%]
    root@aix:/yum/rpm>
YUM on AIX – how to install – “done the Perzl way” (4/4)

5. Fix the Berkeley Database "version mismatch" errors

```
root@aix:> rm -f /var/lib/rpm/__db*
```

From https://bugzilla.redhat.com/show_bug.cgi?id=553998:

If you are seeing DB_VERSION_MISMATCH, then you are accessing
/var/lib/rpm with two different versions of Berkeley DB in RPM.

The workaround is to do
```
rm -f /var/lib/rpm/__db*
```
when DB_VERSION_MISMATCH is encountered.

→ Now everything should work smoothly... 😊
Recent security vulnerability of Samba – “SambaCry“
Recent security vulnerability of Samba – “SambaCry“

- Recent security vulnerability of Samba – “SambaCry“

**Exploit:**
- Remote code execution from a writable share.

**Affected versions:**
- Samba 3.x after 3.5.0
- Samba 4.x before 4.4.14, 4.5.x before 4.5.10, and 4.6.x before 4.6.4

**Summary:**
- Malicious clients can upload and cause the smbd server to execute a shared library from a writable share.

**How to fix:**
- Upgrade to latest versions 4.4.15, 4.5.10 or 4.6.5
- AIX: Version 4.5.7 from Toolbox, perzl.org to come very soon!
Questions?

Thank you for your attention!

FROM NOW ON, I WANT YOU TO USE OPEN SOURCE SOFTWARE FOR EVERYTHING WE DO. IT’S FREE.

I’LL BE RIGHT BACK.

IT’S AN EMERGENCY. I THINK HE’S BEEN READING.

WE KNOW YOU HAVE A TRADE PUBLICATION IN HERE. HAND IT OVER AND NO ONE HAS TO GET HURT.
Backup charts
Pre-YUM RPM dependency hell solutions – obsolete now
1) My pre-YUM solution approach (1/3)

- What you want is a complete and self-contained list of dependencies for the RPM file `aaa.rpm`.
- You download all the RPM packages on this list (make sure that you have downloaded them all into a separate directory which was empty before).
- After downloading all the RPM packages on the list you can just install the RPM file `aaa.rpm` in this directory as easy as

```
# rpm -Uvh *.rpm
```

- This approach mimics the behavior of AIX NIM
  - a software bundle (the list here)
  and
  - a lpp_source (the separate directory containing all required RPM files).
1) My pre-YUM solution approach (2/3)

- Every time I update any packages on http://www.perzl.org/aix I also update the bundle files, i.e., they always contain the latest dependency RPM files.

- You can find the bundle files here: ftp://www.oss4aix.org/bundles/

**Efficient way of downloading RPM bundles:**

- Use wget to download (also available for Windows)
- Download with FTP protocol

\[
\textbf{# wget -B ftp://www.oss4aix.org/everything/RPMS/ -i <bundle-file>}
\]

- Download with HTTP protocol

\[
\]
Combining RPM bundle files

- So what do you have to do if you want to combine multiple RPM bundle files into one, e.g., you want a combined list for Apache and PHP.
- Those are the required steps (in the example I use AIX 6.1 and please note that the exact version numbers might vary):
  - Download from ftp://www.oss4aix.org/bundles/aix61:
    - httpd.aix61.bundle
    - mod_php_ap24.aix61.bundle
  - Then combine those two lists as follows:

    ```
    cat httpd.aix61.bundle mod_php_ap24.aix61.bundle | sort | uniq > httpd+php.aix61.bundle
    ```

- Afterwards you have a combined bundle file (httpd+php.aix61.bundle) for Apache and PHP that you can then use to download all required RPMs.
2) Other solution: rpmplus from Barry Williams

- Get it here: [http://earth2baz.net/rpmplus/](http://earth2baz.net/rpmplus/)

  *rpmplus is a simple shell wrapper script which does dependency resolution by querying each package dependency list and builds a single argument list for the rpm command.*

- **You need:**
  - rpmplus from above, download it to your AIX client and make it available as a command
  - A repository of RPMs for your AIX version (possibly best on a NFS server)
    - Get your RPM repository from [ftp://www.oss4aix.org/compatible/](ftp://www.oss4aix.org/compatible/)
    - Mount this RPM repository on your AIX client (e.g., at /nfs/aixrepos/aix71)
    - Define this environment to point to this mounted RPM repository
      ```
      # export RPMPLUSREPO=/nfs/aixrepos/aix71
      ```
  - Now use rpmplus, for instance to install wget
    ```
    # rpmplus -rUvh wget
    ```

- Check also out: [Managing RPM repositories in AIX](#)