Managing Application Streams in Red Hat Enterprise Linux 8

Langdon White
Principal Software Engineer, Modularity, Red Hat

Daniel Mach
Principal Software Engineer, Software Management, Red Hat

May 7-9 2019
Us!

Langdon White  
- Formerly Dev Advocate, RHEL  
- Platform Architect  
- Fedora Modularity Objective Lead

Daniel Mach  
- Formerly Release Engineer  
- YUM/DNF Team Lead

look, all in one picture!
Why?
What is an Application Stream?

A new way of building, organizing and delivering software.
OK, but really?

**Alternative Streams**
User can choose among various versions of software.

**Discoverability**
List available streams easily.

**Content dependencies**
By choosing a stream, you get it including dependencies.

**Life-cycle support**
Every stream can have a different life-cycle.

**Simpler subscriptions**
All streams are available in a single repository
How does all this work?
Repositories

<table>
<thead>
<tr>
<th>Server</th>
<th>Client</th>
<th>Workstation</th>
<th>Compute Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>optional</td>
<td>extras</td>
<td>supplementary</td>
<td>optional</td>
</tr>
</tbody>
</table>

Subscription Type

- 7
- 8

- AppStream
- BaseOS
- CodeReady Linux Builder

Server, Client, Workstation, Compute Node, AppStream, BaseOS, Developer
Demo: Traditional use cases
$ yum install postgresql
Installing:
  postgresql x86_64 10.6-1.module+el8+2469+5ecd5aae rhel-8-for-x86_64-appstream-rpms 1.5 M
Installing dependencies:
  libpq x86_64 10.5-1.el8 rhel-8-for-x86_64-appstream-rpms 188 k
Enabling module streams:
  postgresql 10
# the package is installed from a default stream (postgresql:10) which gets enabled automatically

$ yum install postgresql-server
Installing:
  postgresql-server x86_64 10.6-1.module+el8+2469+5ecd5aae rhel-8-for-x86_64-appstream-rpms 5.1 M
# the package is installed from the stream that was enabled previously
RHEL 8 BaseOS and AppStream

**BaseOS**
- kernel
- bash

**AppStream**
- Application streams
  - postgresql:9.6
  - postgresql:10
  - mariadb:10.3
- Non-modular RPMs
  - bind
  - cmake
  - cups
  - gcc
Stream States

Active

● **Enabled**
  Packages from the stream are available.

● **Default** (set by the OS)
  Packages from the stream are available.
  Stream gets automatically enabled when an RPM from the stream is installed.

Inactive

● **Disabled**
  Packages from the stream are not available.

● **"Undefined"**
  Packages from the stream are not available.
  Stream may get enabled as another stream's dependency.
Demo: Listing and enabling streams
dependencies resolved.

<table>
<thead>
<tr>
<th>Package</th>
<th>Arch</th>
<th>Version</th>
<th>Repository</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>postgresql</td>
<td>x86_64</td>
<td>9.6.10-1.module+el8+2470+d1bafa0e</td>
<td>rhel-8-for-x86_64-appstream-rpms</td>
<td>1.4 M</td>
</tr>
</tbody>
</table>

transaction summary

downgrade 1 package

total download size: 1.4 M
is this ok [y/N]: y

downloading packages:
postgresql-9.6.10-1.module+el8+2470+d1bafa0e.x86_64.rpm | 61 MB/s | 1.4 MB | 00:00 |

running transaction check
transaction check succeeded.
running transaction test
transaction test succeeded.
running transaction

preparing:
  downgrading: postgresql-9.6.10-1.module+el8+2470+d1bafa0e.x86_64 | 1/1 |
  cleanup: postgresql-10.6-1.module+el8+2469+5ecd5aae.x86_64   | 1/2 |
  running scriptlet: postgresql-10.6-1.module+el8+2469+5ecd5aae.x86_64 | 2/2 |
Demo: Listing and enabling streams
(hidden slide)

```bash
$ yum module list
$ yum module list | grep postgres
postgresql 10 [d] client, server [d] PostgreSQL server and client module
postgresql 9.6 client, server [d] PostgreSQL server and client module

$ yum module enable postgresql:10
Enabling module streams:
  postgresql 10

$ yum module list | grep postgres
postgresql 10 [d][e] client, server [d] PostgreSQL server and client module
postgresql 9.6 client, server [d] PostgreSQL server and client module

$ yum install postgresql
Installing:
  postgresql x86_64 10.6-1.module+el8+2469+5ecd5aae rhel-8-for-x86_64-appstream-rpms 1.5 M
Installing dependencies:
  libpq x86_64 10.5-1.el8 rhel-8-for-x86_64-appstream-rpms 188 k
```
$ yum module reset postgresql
Resetting module streams:
  postgresql 10

$ yum module enable postgresql:9.6
Enabling module streams:
  postgresql 9.6

$ yum distro-sync
Downgrading:
  postgresql x86_64 9.6.10-1.module+el8+2470+d1bafa0e  rhel-8-for-x86_64-appstream-rpms 1.4 M
What is available, when?
Let’s go through some use cases

- **Scenario:** No AppStreams enabled
  - Default install of RHEL8
- **Scenario:** AppStream enabled
  - User has elected to enable an AppStream either explicitly or because they installed something from an AppStream via defaults
- **Scenario:** Hot Fix Repo
  - User or Red Hat has supplied changed RPMs to resolve an issue
- **Scenario:** Hot Fix Repo & AppStream Enabled
  - User or Red Hat has supplied changed RPMs to resolve an issue and the user has enabled a newer AppStream

**Hints:**
- Packages with the highest version prevail.
- Non-modular packages are filtered out when they match by name with modular packages from any active stream.
- To protect a repository from filtering, specify `module_hotfixes=1` in the .repo file.
Scenario: No AppStreams Enabled

Package is available, because it's not overridden by a modular package.

Package is not available because it's part of an inactive stream.
Scenario: AppStream enabled

Package is not available, because it is overridden by a modular package from an active stream

Package is available because it's part of an active stream
**Scenario: Hot Fix Repo**

### Packages

- **BaseOS**
  - `bash-4.4-1.el8`

- **Hotfix Repo**
  - `module_hotfixes=1`
  - `bash-4.4-2.el8`

- **AppStream**
  - `bash:5 (inactive)`
  - `bash-5.0-1.el8`

### Availability

- **Package is available, because it's not overridden by a modular package**
- **Package is available, because it's part of a hotfix repository**
- **Package is not available, because it's part of an inactive stream**
Scenario: Hot Fix Repo & AppStream Enabled

Package is not available, because it is overridden by a modular package from an active stream

Package is available, because it's part of a hotfix repository

Package is available because it's part of an active stream
Demo: Package filtering
$ yum config-manager --set-enabled f30
$ yum repolist
repo id                           repo name                status
f30                                Fedora 30 (RPMs)             0      
rhel-8-for-x86_64-appstream-rpms   Red Hat Enterprise Linux 8 for x86_64 - AppStream (RPMs) 4672 
rhel-8-for-x86_64-baseos-rpms     Red Hat Enterprise Linux 8 for x86_64 - BaseOS (RPMs) 1658 

$ yum install postgresql
Installing:
  postgresql  x86_64  10.6-1.module+el8+2469+5ecd5aae  rhel-8-for-x86_64-appstream-rpms  1.5 M
Installing dependencies:
  libpq  x86_64  10.5-1.el8  rhel-8-for-x86_64-appstream-rpms  188 k
Enabling module streams:
  postgresql  10
Is this ok [y/N]: n
# But where is postgresql 11 I put into f30 repository? It's filtered out due to modularity.

$ yum module disable postgresql
Disabling module streams:
  postgresql  10
$ yum repolist
$ yum install postgresql
Installing:
  postgresql  x86_64  11.2-3.fc30  f30              6.4 k
What’s Next?
Long-term vision

YUM / DNF
- Move all business logic from Python (DNF) into a shared C library (libdnf)

MicroDNF
- Functional parity with DNF, almost identical look & feel to DNF
- For any use cases where small footprint is required (containers, various images)

Better integration with RHEL Installer, RHEL Image Builder, RHEL Web Console, Ansible, Gnome Software, Lorax, rpm-ostree, Subscription Manager and others

& Customer Feedback!!!
Q&A
Q&A and Advertising!

Lab: Using Red Hat Enterprise Linux 8 AppStreams & Containers for App Dev
Day/Time: Thursday, May 9, 2:00 p.m.-4:00 p.m. Likely Sold Out
Sources: https://gitlab.com/redhatsummitlabs/leveraging-rhel-8-appstreams-and-containers-for-appdev

Lab: The Definitive Red Hat Enterprise Linux 8 Hands-on Lab
Day/Time: May 8, 1:00 p.m.-3:00 p.m.; May 9, 10:45 a.m.-12:45 p.m. Likely Sold Out
Sources:

Come see both or either of us at the RHEL Booth — Weds: 3-5pm; Thurs: 10:30-12:30am!

Upstream: Fedora Modularity
Docs: https://docs.pagure.org/modularity/
Team: https://fedoraproject.org/wiki/Modularity_Team?rd=Modularity_Working_Group

Don’t forget to vote if you like this talk!
**Attributions**

- “Simple pendulum height”, Krishnavedala (Own work) [CC0], via Wikimedia Commons, https://commons.wikimedia.org/wiki/File:Simple_pendulum_height.svg
- "Mustard House White Fence Picket Porch Bushes" by cdsessums is licensed under CC BY-SA 2.0. To view a copy of this license, visit: https://creativecommons.org/licenses/by-sa/2.0
- "Stream" by sk8geek is licensed under CC BY-SA 2.0. To view a copy of this license, visit: https://creativecommons.org/licenses/by-sa/2.0
- "Feedback cards" by Matthew Burpee is licensed under CC BY-NC-SA 2.0. To view a copy of this license, visit: https://creativecommons.org/licenses/by-nc-sa/2.0