SELinux from Developer POV

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Virtual machine setup

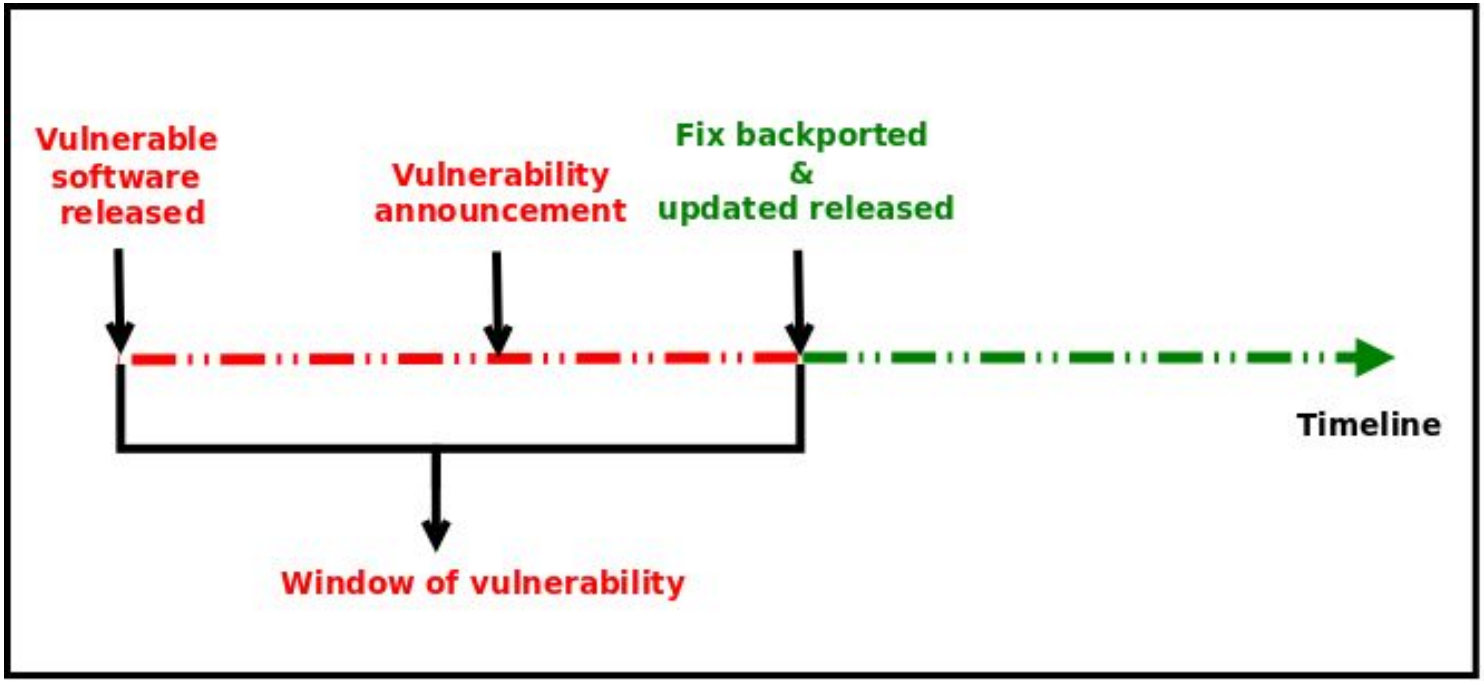
- http://lukas-vrabec.com/image_selinux.tar.xz
- Run “virtual machine manager”
- Create new virtual machine
  - Import existing image
  - Os Type - Linux
  - Customize configuration before install
    - Add hardware
      - Storage, CDROM, cloudinit_iso

Agenda

- Why SELinux ?
- Why ship your own SELinux module ?
- How can I add custom SELinux module into project rpms?
- How can I create Fedora module with custom SELinux module?

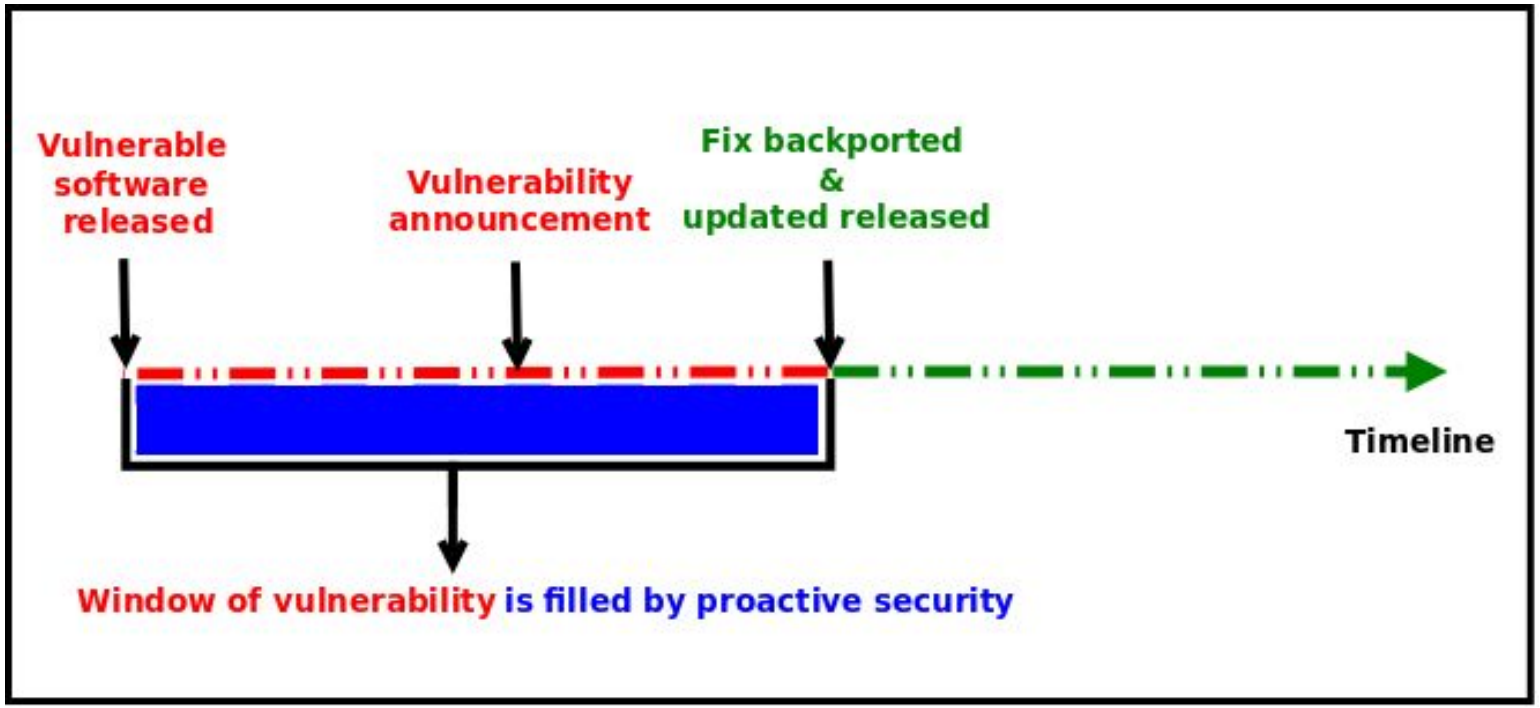
Why SELinux?

REACTIVE SECURITY


Vulnerable
software
released
Vulnerability
announcement
Fix backported
&
updated released
Timeline
Window of vulnerability

YOUR SYSTEM **IS NOT PROTECTED** DURING THE WINDOW OF VULNERABILITY!

PROACTIVE SECURITY


Vulnerable software released
Vulnerability announcement
Fix backported & updated released
Timeline
Window of vulnerability is filled by proactive security

PROACTIVE SECURITY HELPS TO **PROTECT** YOUR SYSTEM DURING THE WINDOW OF VULNERABILITY!

SECURITY ENHANCED LINUX IS A SECURITY MECHANISM BRINGING PROACTIVE SECURITY FOR YOUR SYSTEM.

Traditional Linux Security

$ ls -dl /var/www/html/

drwx r-x r-x. 2 root root /var/www/html/

SELinux Security Policy

CORE COMPONENT OF SELINUX

CORE COMPONENT OF SELINUX

COLLECTION OF SELINUX POLICY RULES

CORE COMPONENT OF SELINUX

COLLECTION OF SELINUX POLICY RULES

LOADED INTO THE KERNEL BY SELINUX USERSPACE TOOLS

ENFORCED BY THE KERNEL

ENFORCED BY THE KERNEL

USED TO AUTHORIZE ACCESS REQUESTS ON THE SYSTEM

BY DEFAULT **EVERYTHING** IS DENIED AND YOU DEFINE POLICY RULES TO ALLOW CERTAIN REQUESTS.

SELINUX POLICY RULES

DESCRIBE AN **INTERACTION** BETWEEN PROCESSES AND SYSTEM RESOURCES

SELINUX VIEW OF THAT INTERACTION

```
ALLOW apache_process apache_log:FILE
READ;
```

`apache_process` `apache_log`

ARE **LABELS**

LABELS

ASSIGNED TO PROCESSES

ASSIGNED TO PROCESSES

ASSIGNED TO SYSTEM RESOURCES

ASSIGNED TO PROCESSES

ASSIGNED TO SYSTEM RESOURCES

BY SELINUX SECURITY POLICY

ASSIGNED TO PROCESSES

ASSIGNED TO SYSTEM RESOURCES

BY SELINUX SECURITY POLICY

MAP REAL SYSTEM ENTITIES INTO THE SELINUX WORLD

LABELS IN REALITY

STORED IN EXTENDED ATTRIBUTES OF FILE SYSTEMS - EXT2,EXT3, EXT4 ...

```
# getfattr -n security.selinux /etc/passwd
getfattr: Removing leading '/' from absolute path
names
# file: etc/passwd
security.selinux="system_u:object_r:passwd_file_t:s0"

# ls -Z /etc/passwd
system_u:object_r:passwd_file_t:s0 /etc/passwd
```

Benefits of shipping own SELinux module

- Changes in a policy can be modified immediately, so the product package maintainer does not need to wait until the distribution SELinux policy is updated.

- Policy changes in product SELinux policy can be released together with changes in product package so SELinux policy will be always synchronized with a product.

- Product package can follow different timeline deadlines then SELinux policy package, this can cause issues and customer can get new product package version without necessary changes in SELinux policy and this can block some functionality of a product.

https://fedoraproject.org/wiki/SELinux/IndependentPolicy#Creating_Own_Product_Policies

Independent SELinux policy module

- Write own SELinux policy from scratch and ask SELinux team for policy review. Note that a guide how to write an SELinux policy from the scratch is not a part of this workshop (See the Generating SELinux Policy Modules: sepolicy generate section in the SELinux Guide).

- Extract an SELinux policy from a distribution policy package. The Git repository with distribution policies is located on github.com/fedora-selinux/selinux-policy and github.com/fedora-selinux/selinux-policy-contrib.

Agreement workflow

Before you start with shipping own product policies, let the Red Hat SELinux team know about your intentions. To do this, use Fedora mailing list or contact SELinux policy maintainer:

- SELinux Policy maintainer
- selinux@lists.fedoraproject.org

Git Repository setup

 # Create directory to contain the project

$ mkdir myapp-selinux

$ cd myapp-selinux

 # initialize git repository

$ git init

 # Push git repository to remote e.g. to github.com

$ git remote add origin git@github.com:username/myapp-selinux

$ git push -u origin master

Preparing sources for the Policy Git Repository

- **License**
  - A Git repository should not contain only SELinux policy source files, but also a license. For more information how to add an open source license in your repository, see the Adding a license to a repository article on the GitHub Help. Distribution policies have GPL license, so any policy extracted from Distribution policy must have GPL compatible license.
- **Makefile**
  - https://fedoraproject.org/wiki/SELinux/IndependentPolicy#Creating_Own_Product_Policies
  - In section Makefile
- **Policy source**
  - Type enforcement file (*.te)
  - File contexts file (*.fc)
  - Interface file (*.if)

$ ls

Makefile myapp.fc myapp.if myapp.te LICENSE

$ make

```
make -f /usr/share/selinux/devel/Makefile myapp.pp
make[1]: Entering directory '/home/lvrabec/devel/documentations/examples'
Compiling targeted myapp module
/usr/bin/checkmodule:  loading policy configuration from tmp/myapp.tmp
/usr/bin/checkmodule:  policy configuration loaded
/usr/bin/checkmodule:  writing binary representation (version 17) to tmp/myapp.mod
Creating targeted myapp.pp policy package
rm tmp/myapp.mod.fc tmp/myapp.mod
make[1]: Leaving directory '/home/lvrabec/devel/documentations/examples'
Compressing myapp.pp -> myapp.pp.bz2
bzip2 -9 myapp.pp
```

```
$ cd ../
$ tar -czf myapp-selinux.tar.gz myapp-selinux/
```

SELinux policy is ready!

Creating spec file

Spec file will be described on the Independent Policy wiki page:

https://fedoraproject.org/wiki/SELinux/IndependentPolicy#Creating_Own_Product_Policies

Setting booleans During a package installation

Usage of booleans in a .spec file follows these rules:

- If a boolean mentioned in the product .spec file is not set by user previously, it will be changed in the %post install phase and during the %post uninstall phase will be reverted.
- If a boolean mentioned in the product .spec file was set by user previously, it will be changed to a value from this file. However, during the uninstallation of a product SELinux subpackage, it will not be reverted.

Port labelling during a package installation

```
if %{_sbindir}/selinuxenabled ; then
    %{_sbindir}/load_policy
    %relabel_files
    %{_sbindir}/semanage port -a -t product_port_t -p tcp 1111
fi
```

Move your SELinux product policy sources to the proper destination:

$ cp myapp-selinux.tar.gz ~/rpmbuild/SOURCES/

Build your product (sub)package with an own SELinux policy:

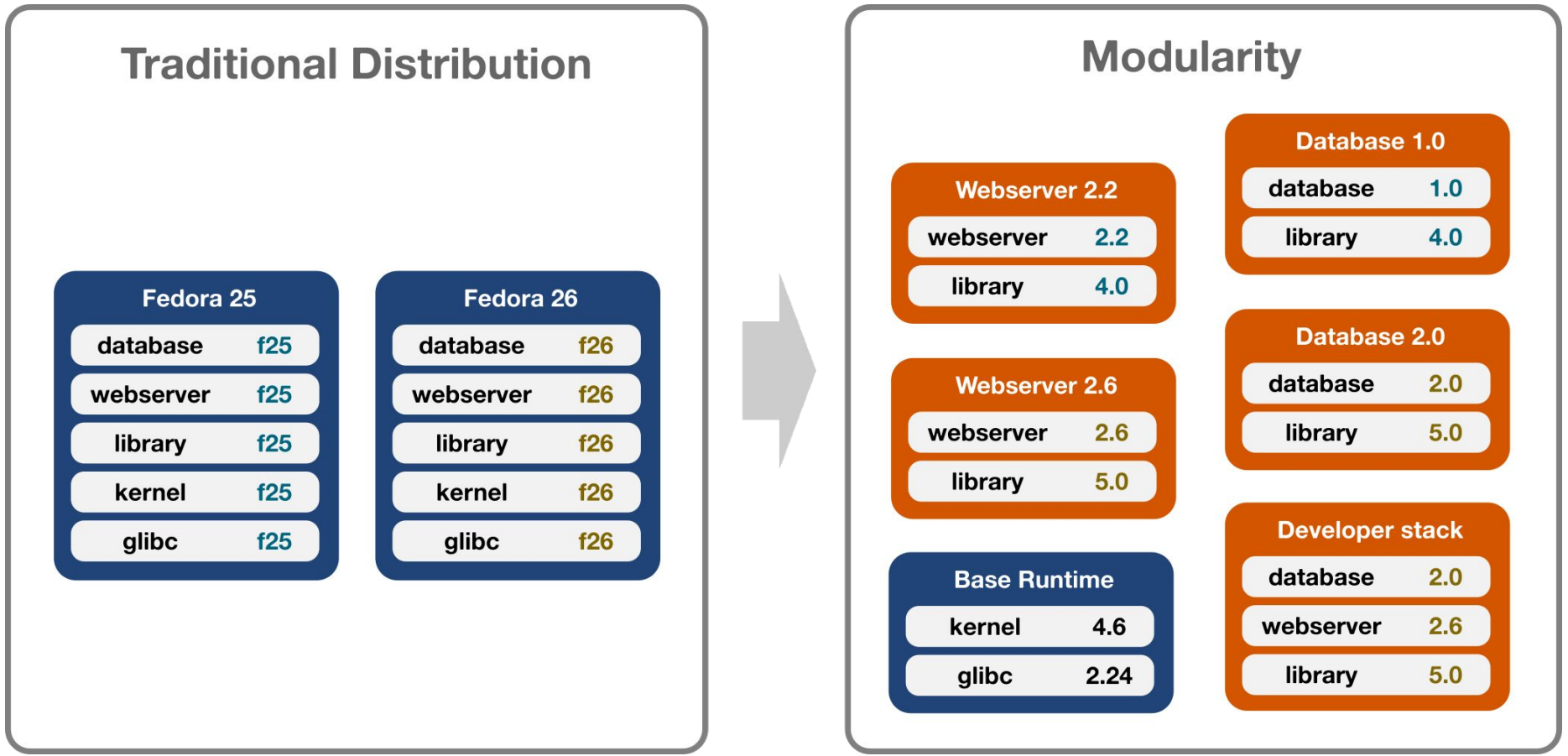
 # rpmbuild -ba myapp-selinux.spec

Removing an Own Product Policy from the System Policy

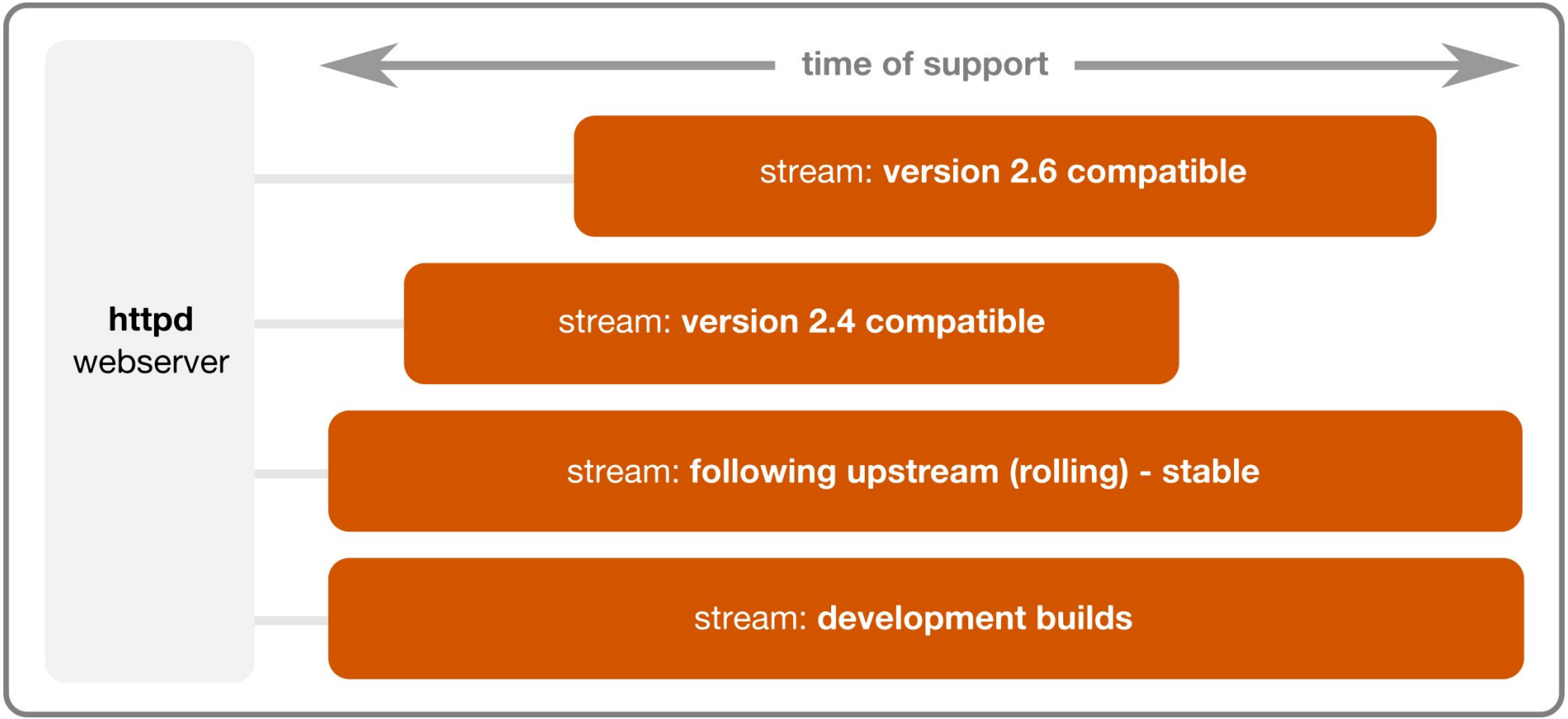
When is your own product SELinux subpackage ready for a release, contact the SELinux policy maintainer. He should remove a product policy from the SELinux distribution policy and update the package. A product maintainer should add dependency for the selinux-policy package:

```
# Version of selinux-policy when product policy was removed
%global selinux_policyver POLICY_VERSION
Requires: selinux-policy >= %{selinux_policyver}
```

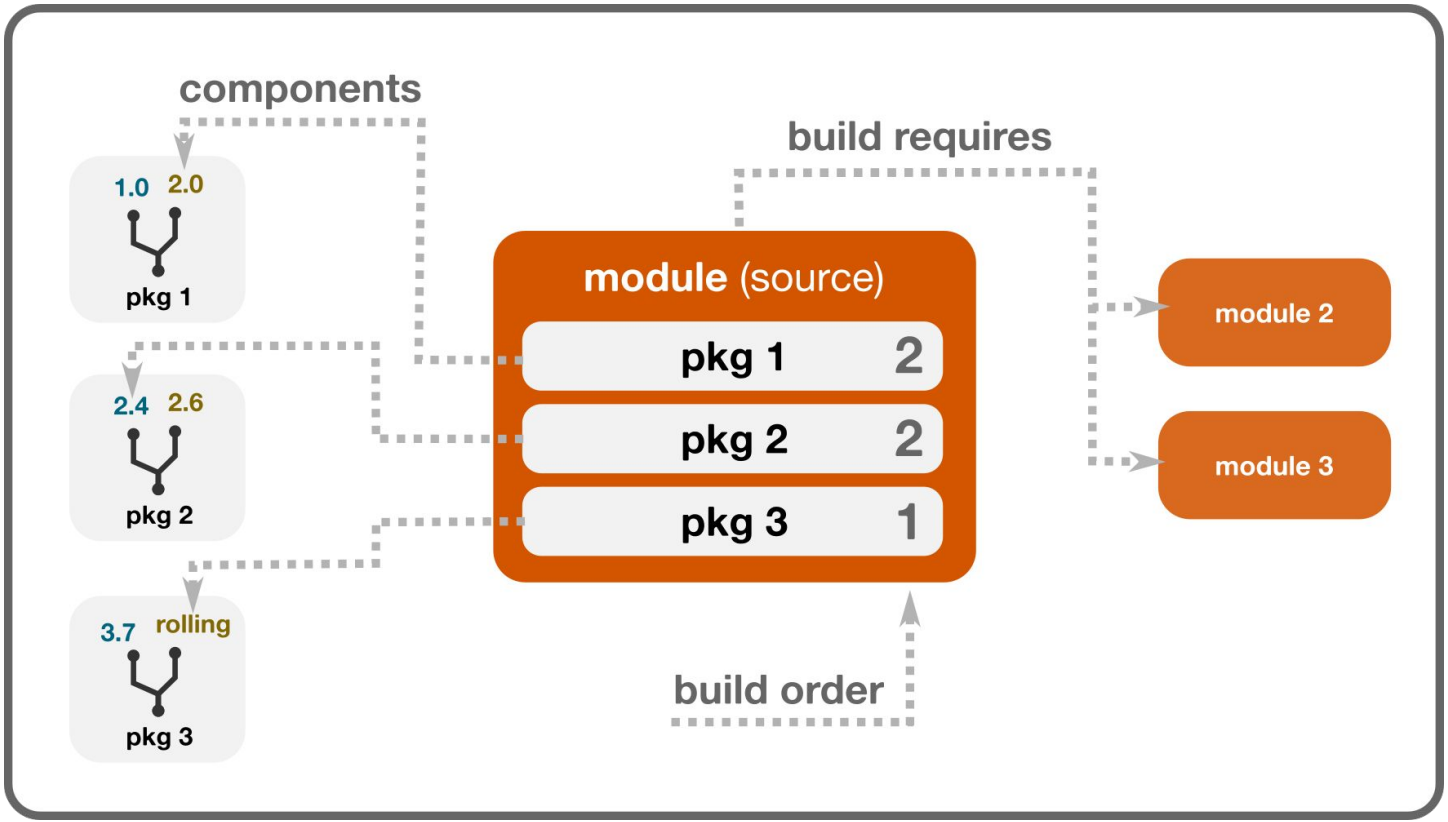
How can I create Fedora module with custom SELinux module?


Traditional Distribution
Fedora 25
database f25
webserver f25
library f25
kernel f25
glibc f25
Fedora 26
database f26
webserver f26
library f26
kernel f26
glibc f26
Modularity
Webserver 2.2
webserver 2.2
library 4.0
Webserver 2.6
webserver 2.6
library 5.0
Base Runtime
kernel 4.6
glibc 2.24
Database 1.0
database 1.0
library 4.0
Database 2.0
database 2.0
library 5.0
Developer stack
database 2.0
webserver 2.6
library 5.0

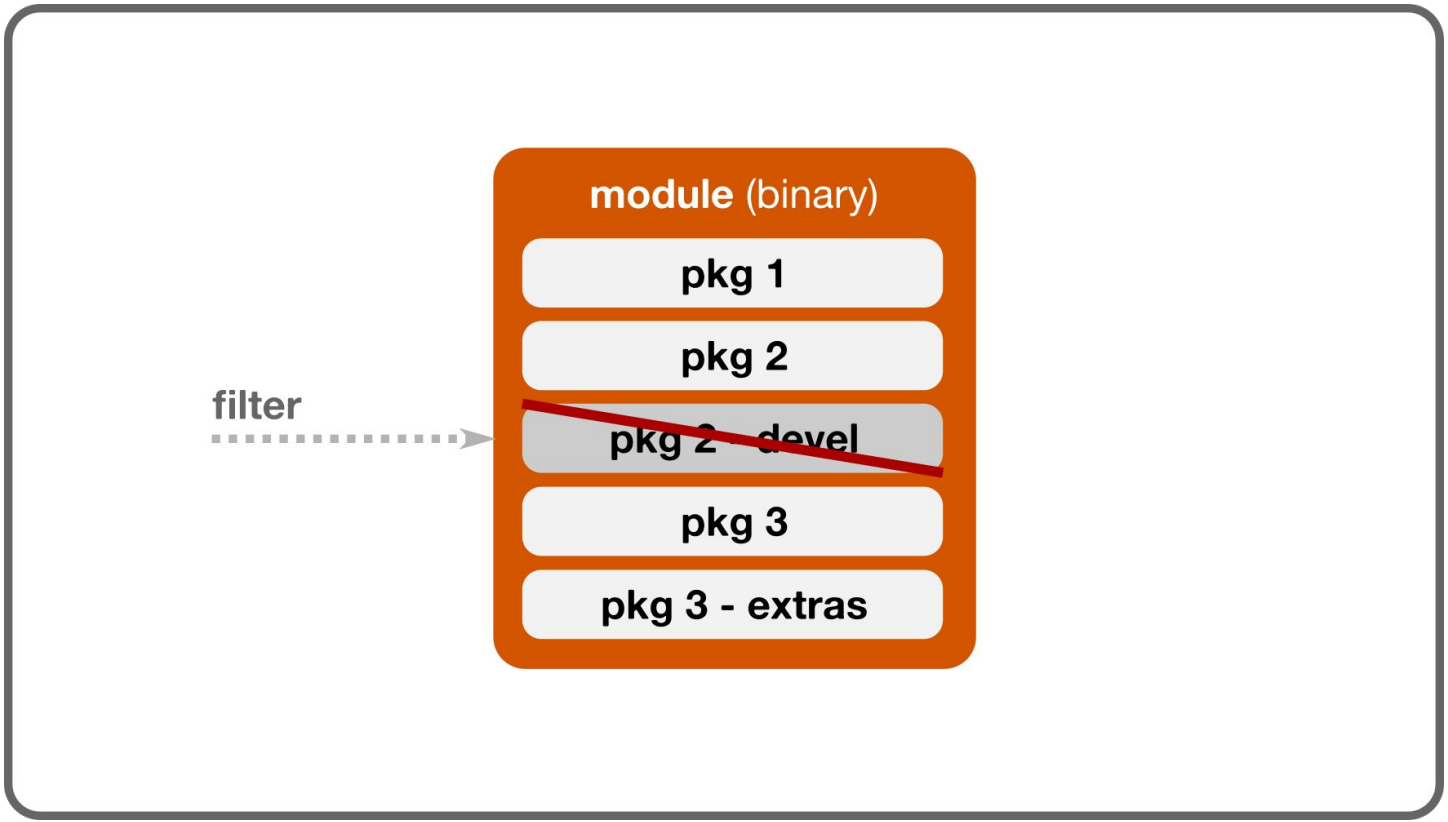
Module **streams**



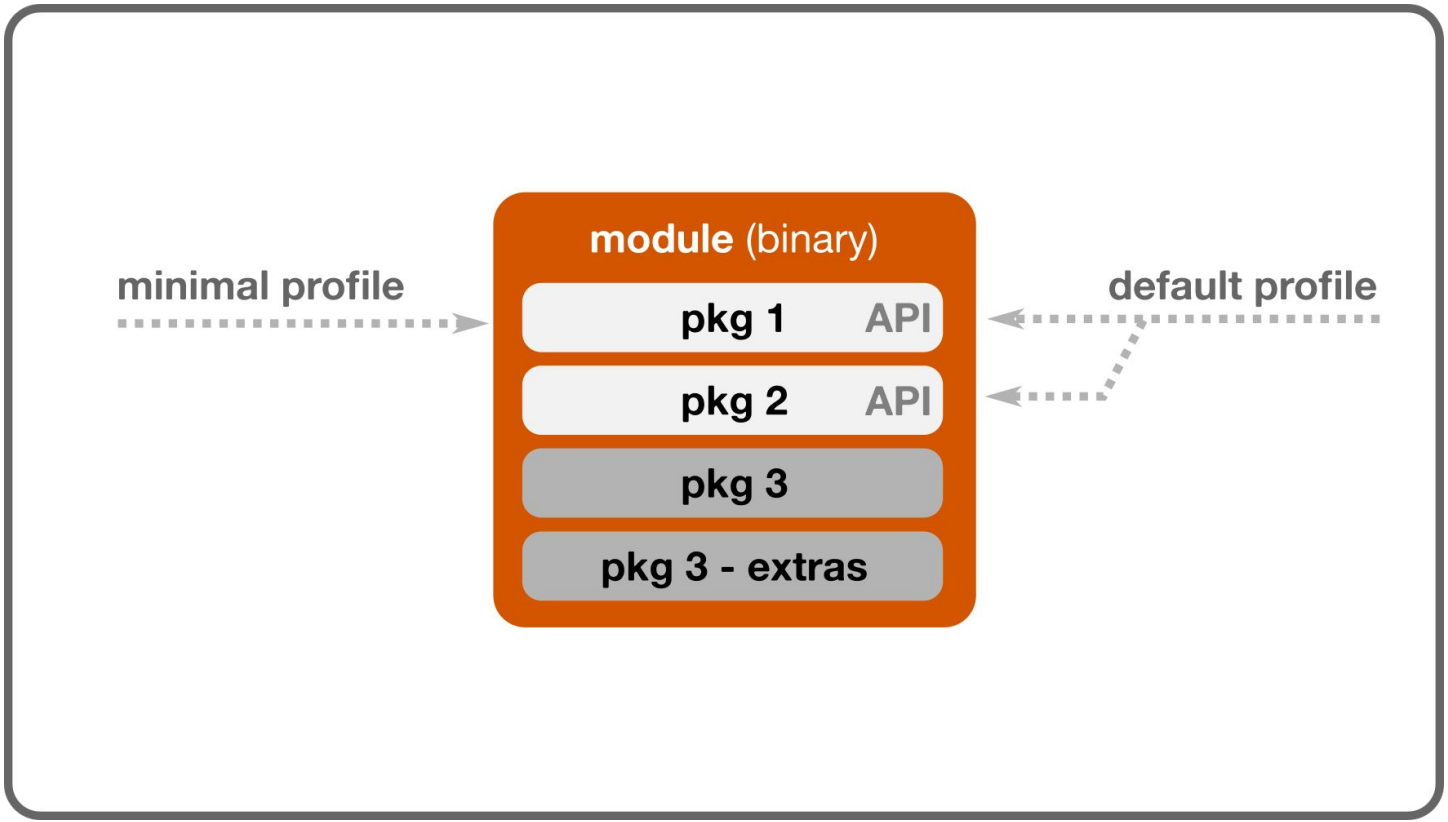
Define **how to build** the module



Decide **what to ship**



Specify **how to use**



QUESTIONS?

Miroslav Grepl's blog	https://mgrepl.wordpress.com/
Paul Moore's blog	http://www.paul-moore.com/
Lukas Vrabec's blog	https://lukas-vrabec.com/
Dan Walsh's blog	http://danwalsh.livejournal.com/

THANK YOU