CUPS 2.4/2.5/3.0

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Agenda

- Whose CUPS is This?
- CUPS 2.4: Summary, Planning
- CUPS 2.5: Summary, Planning
- CUPS 3.0: Transition, Architecture, Breaking Up the Band, Library Cleanup, Challenges/Needs, Planning

Whose CUPS is This?

- After I left Apple in December 2019, development of CUPS at Apple slowed and many issues and pull requests were not resolved
- In September 2020, I approached the OpenPrinting maintainers to fork Apple CUPS so that we could restart development
- In March 2021, Apple contracted me to merge many of the OpenPrinting CUPS bug fixes back into Apple CUPS for a 2.3.5 release
  - Apple's focus is currently only on bug fixes for CUPS 2.3.x
- OpenPrinting has taken over new CUPS feature development starting with CUPS 2.4

Organization

- CUPS is a project of OpenPrinting whose core developers consist of the packagers and maintainers of CUPS on different operating systems/ distributions
  - Currently no explicit leadership structure, operating by consensus in email discussions
  - Managing the project as a whole by consensus is OK, but has issues
- CUPS also depends on several other OpenPrinting projects (cups-filters in particular) to provide a complete printing solution for Linux, *BSD, etc., so some decisions about CUPS need a broader view

Leadership and Roles

- I have been the de-facto leader/release manager of CUPS for 23 years...
  - *This has to change!*
- Proposal: The core developers can take turns as the release manager for a single minor release cycle
  - Typically a minor release cycle lasts two years - one for development and one for maintenance
  - Development and maintenance overlap, so there will always be at least two release managers active (in case of emergencies)

Release Manager Role

- Responsibilities are:
  - Management of a feature release ("vM.N") milestone in Github
  - Coordination with/coaching of developers for bug fixes and features
  - Coordination with other release managers for bug fixes
  - Monitoring of CI builds
  - Creation of release tarballs and announcements as needed
- *A release manager's job is not to do all of the coding!*

CUPS 2.4

Summary

- Over 90 issues fixed/PRs merged in CUPS 2.4 since CUPS 2.3.3op2
- Adds official AirPrint™/Mopria printer sharing support
- Adds `cupsSetOAuthCallback` API to support OAuth challenges (RFC 6750)
- Adds explicit container support (snapcraft for 2.4.0)
- Adds `pkg-config` support
- Deprecates (but doesn't remove) Kerberos and `cups-config`

Planning

- I'm close to releasing the first beta of CUPS 2.4
- Proposed schedule:
  - 2.4-b1: September 24, 2021
  - 2.4-rc1: October 8, 2021
  - 2.4.0: October 22, 2021
  - 2.4.1: January 2022
  - 2.4.2: March 2022

Planning

- After releasing 2.4.0 I'll create a v2.4.x branch from master
- Bug fixes then get merged to master and v2.4.x
  - Features are only merged to master
- *Who will take over as the 2.4 release manager?*

CUPS 2.5

Summary

- A few features are currently queued up:
  - OAuth support in cupsd (Issue #246)
  - Default OAuth callback for desktop (D-BUS API?)
  - TLS/X.509 improvements (Issue #99)
  - Centralized CUPS localization (Issue #216)
  - Docker, AppImage, other container technologies?
- *Who will be the 2.5 release manager?*

Planning

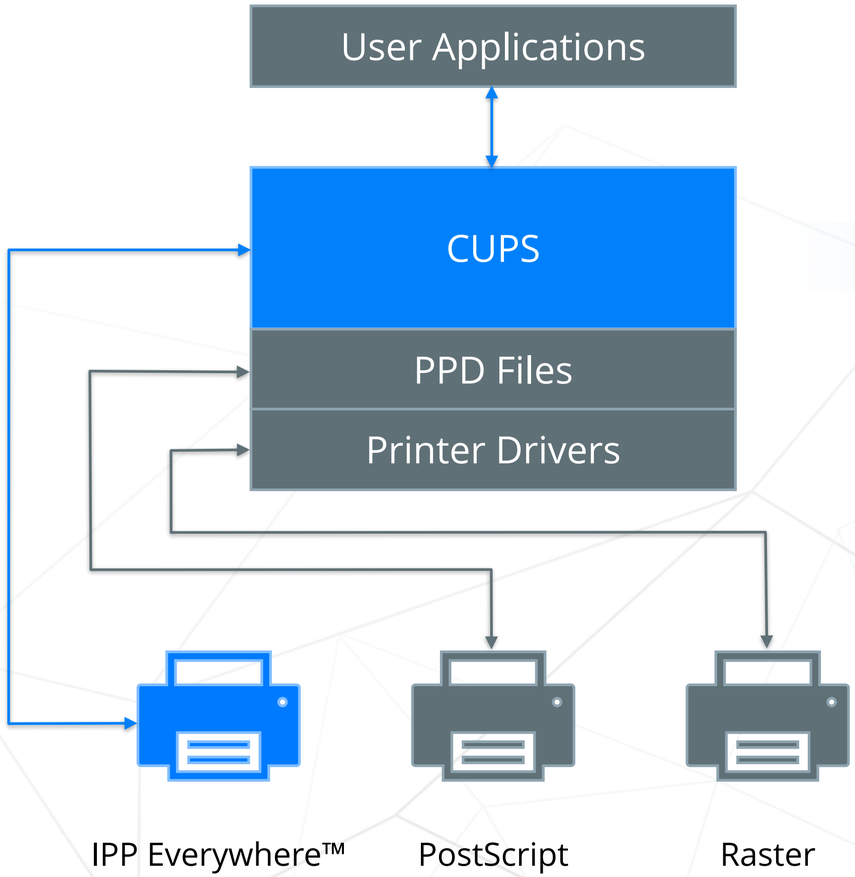
- Proposed schedule:
  - 2.5-b1: September 2022
  - 2.5-rc1: October 2022
  - 2.5.0: November 2022
  - 2.5.1: January 2023
  - 2.5.2: March 2023

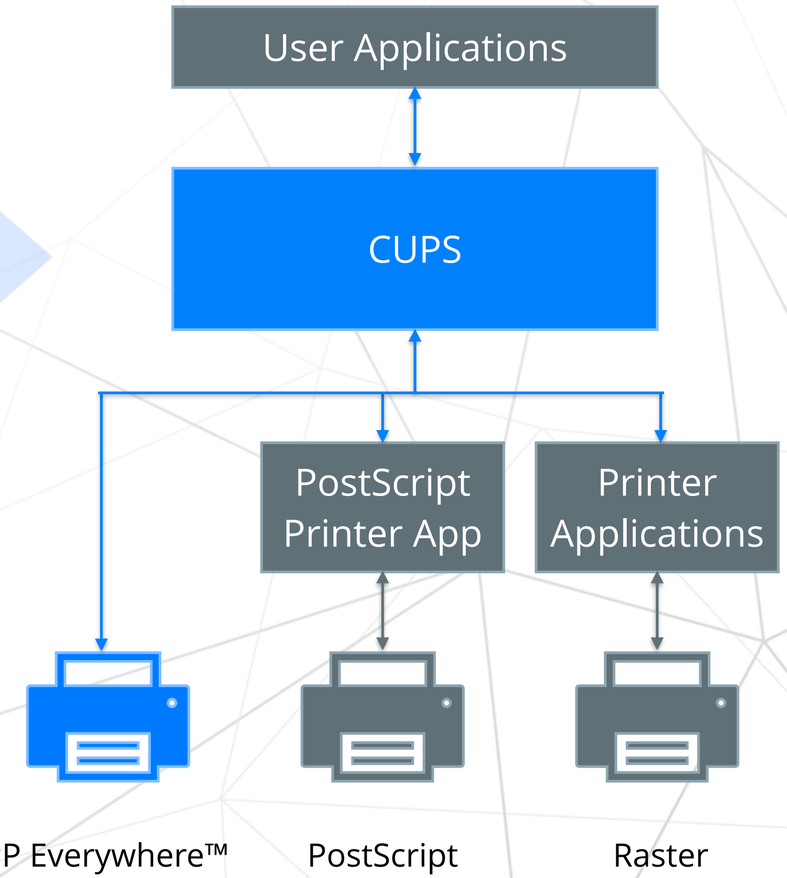
Planning

- Probably the last of the 2.x series
  - Should we commit to doing 2.5.x updates after 3.0.0 is out? If so, how long?
  - Important to coordinate X.509/OAuth functionality with 3.0 development to minimize differences and provide a clear migration path
- Need to enlist desktop developer(s) for OAuth UI
  - Create separate project as needed for UI and D-Bus service that libcups can talk to

CUPS 3.0

Transition

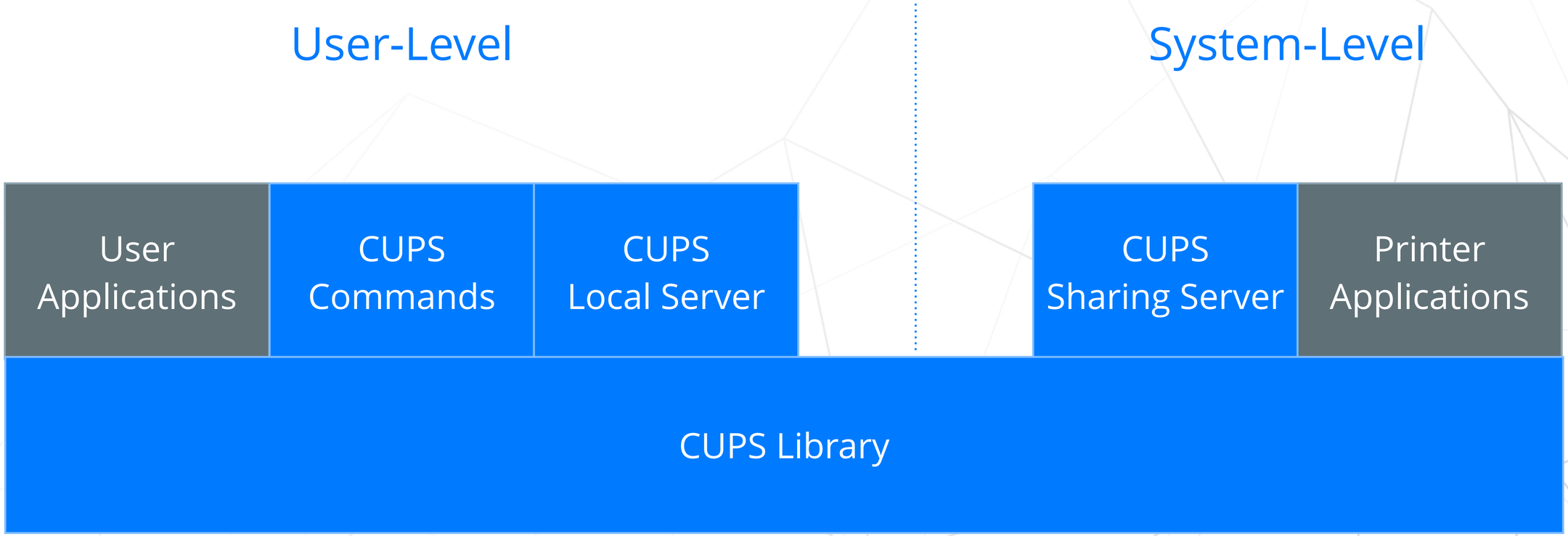

User Applications
CUPS
PPD Files
Printer Drivers
IPP Everywhere™
PostScript
Raster


User Applications
CUPS
PostScript Printer App
Printer Applications
IPP Everywhere™
PostScript
Raster

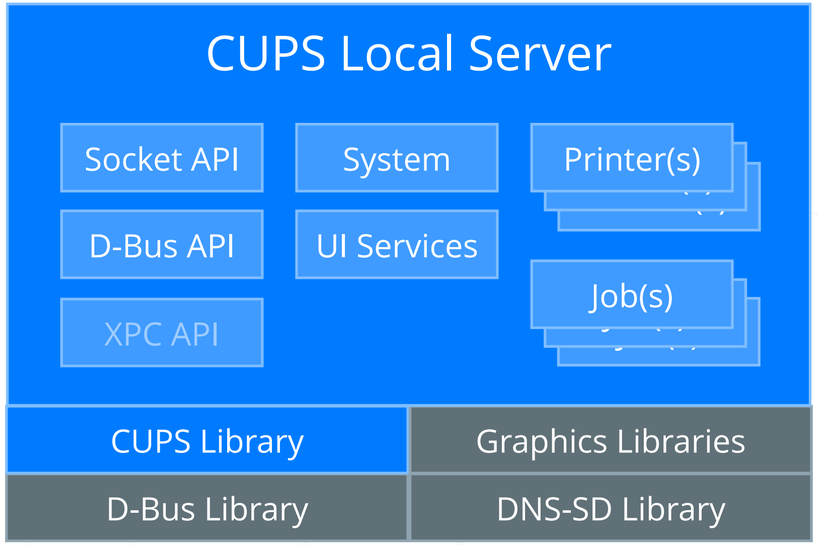
Architecture

- Commands: lp, lpr, lpstat, cancel, etc.
- Local Server: runs as user, IPP domain sockets/D-BUS/XPC, only temporary queues, basic spooling and filtering/rasterization, limited job history
- Sharing Server: runs as root, IPP domain/TCP sockets, only permanent queues, advanced spooling and filtering/rasterization, job history and accounting, push/pull/release printing, authentication, web interface, configurability
- Library: libcups, as exists today

Architecture



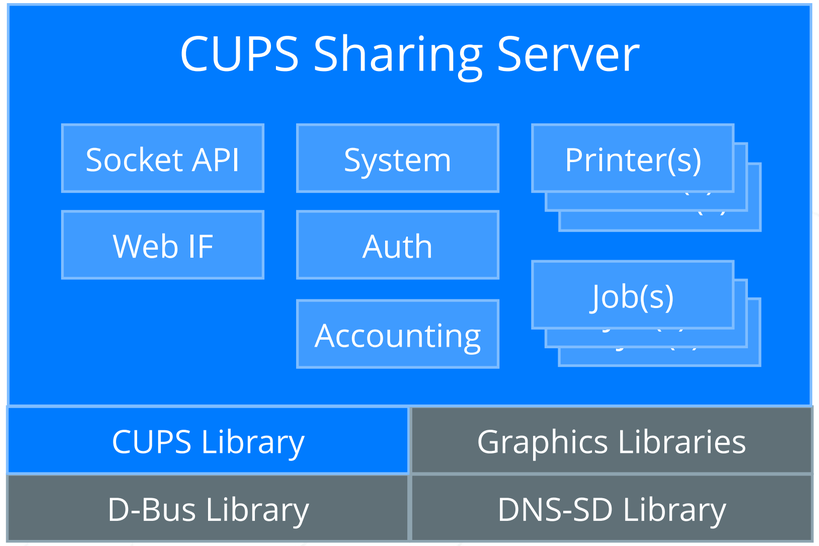
Architecture



(Socket API == IPP)

- Handles all discovery and communications with printers
- Handles authentication, authorization, consent, and notification UI
- Converts to/from PDF/raster as needed for printers
- Job history is limited to the current session/login
- No web interface
- Configuration limited to listing specific printers or servers that cannot be discovered via DNS-SD ("profiles")

Architecture



(Socket API == IPP)

- Handles all communications with printers
- Authorization/consent/notification UI needs to be handled by client
- Converts to/from PDF/raster as needed for printers
- Push (to printer) and pull/release (from printer/proxy)
- Job history is configurable with accounting interface
- Web interface
- Configuration similar to existing cupsd
- OAuth token introspection (RFC 7662) and scopes for ACLs

Breaking Up the Band

- Split CUPS up into four projects?
  - CUPS library
  - Command-line tools
  - Local server
  - Sharing server
- Advantages: More closely matches current packaging of CUPS, decouples server and library features/bug fixes, path for libcups 2.x?
- Disadvantages: Complicates CI testing and user builds

Library Cleanup

- Major release gives us the opportunity to dump obsolete APIs in the CUPS library
  - `cupsGetClasses`, `cupsGetPrinters`, `httpMD5Password`, PPD APIs, etc.
- Can also take the opportunity to clean up/normalize the APIs
  - `cupsGetDests2` renamed to `cupsGetDests`, etc.
- This would mean bumping the major version of the library, which will cause binary compatibility issues for existing executables
  - Do we care? If so, important to have a story for libcups 2.x support (how long, packaging guidance, etc.)

Challenges/Needs

- Much broader scope and integration than the original CUPS work
- Desktop support - need to uplift GNOME/KDE/XFCE desktops to new D-Bus API for printing, authorization, consent UI
- Need developers to work on the local and sharing servers, desktop UI/services
  - Can probably use/adapt PAPPL code for the core server bits
  - Much of the print dialog work can be repurposed
  - Probably have existing authorization/notification UI we can use

Challenges/Needs

- Graphics libraries - current PDF tools/libraries have problematic licenses or other limitations
  - My PDFio library (https://www.msweet.org/pdfio) can handle PDF filtering but doesn't support rasterization
  - Xpdf/Poppler are GPL2 but provide command-line programs we can run (not ideal but workable)
  - MµPDF (https://mupdf.com) is AGPL and doesn't offer a stable API
  - PDFium (https://opensource.google/projects/pdfium) is BSD-licensed but requires the Chromium build system/tools

Planning

- Release Manager: Me?
- Proposed schedule:
  - January 2022: New projects (as needed) and/or branching
    - *Developing 2.5 and 3.0 in parallel, lots of common work*
  - October 2022: 2.5.0 out, focus on 3.0 development
  - March 2023: 3.0-b1
  - October 2023: 3.0.0

Open Discussion