Vector Printer Driver API Update

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What is a Vector Printer Driver?

- 🌺 Called by render engine, such as Ghostscript or X print server, to convert spool data to PDL.

- 🌺 Generates PDL using higher level graphics commands, instead of rasterized bitmap image.
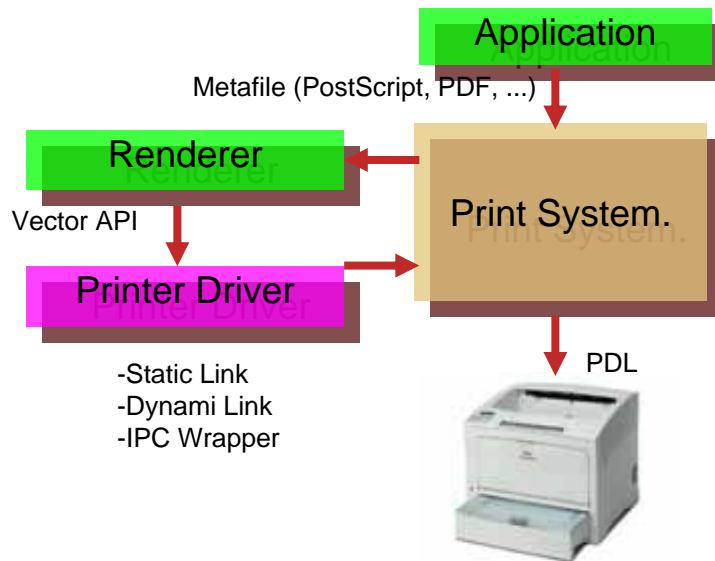
Objectives

- Performance Optimization
  - Achieve full speed printing on fast laser printers
  - Utilizes graphical acceleration feature supported by printer controllers
- Data Size Optimization
  - Reduces size of print data using high level graphics commands.
  - Contributes to reduce network bandwidth and increase through-put
- Print Quality Optimization
  - Utilizes printer's graphics quality enhancement technology by sending vector graphics command
  - Color Optimization
    - Driver can recognize the kind of graphics primitives and switch color scheme – natural color for bitmaps and vivid colors for graphics and text.
- Independent Design from Rendering Engine
  - Single driver architecture can be adopted to various printing environment
- Free from Free Software License Woe
  - Vendor drivers can be provided without making source code open
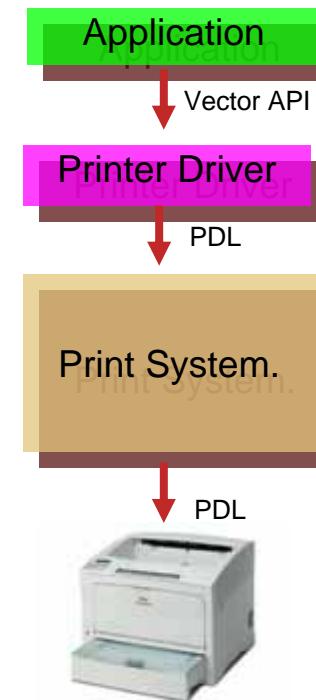
Various Configuration for Vector Printer Driver

(1)

Application

Metafile (PostScript, PDF, ...)

Renderer

Vector API

Printer Driver

-Static Link
-Dynami Link
-IPC Wrapper

Print System.

PDL

(2)

Application

Vector API

Printer Driver

PDL

Print System.

PDL

(3)

Application

GUI Call

GUI Tool Kit

Vector API

Printer Driver

PDL

Print System.

PDL
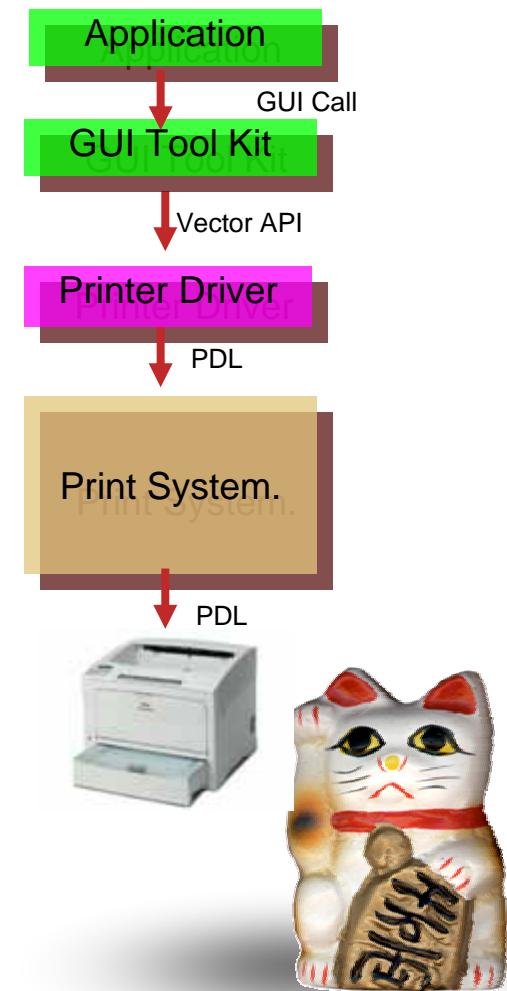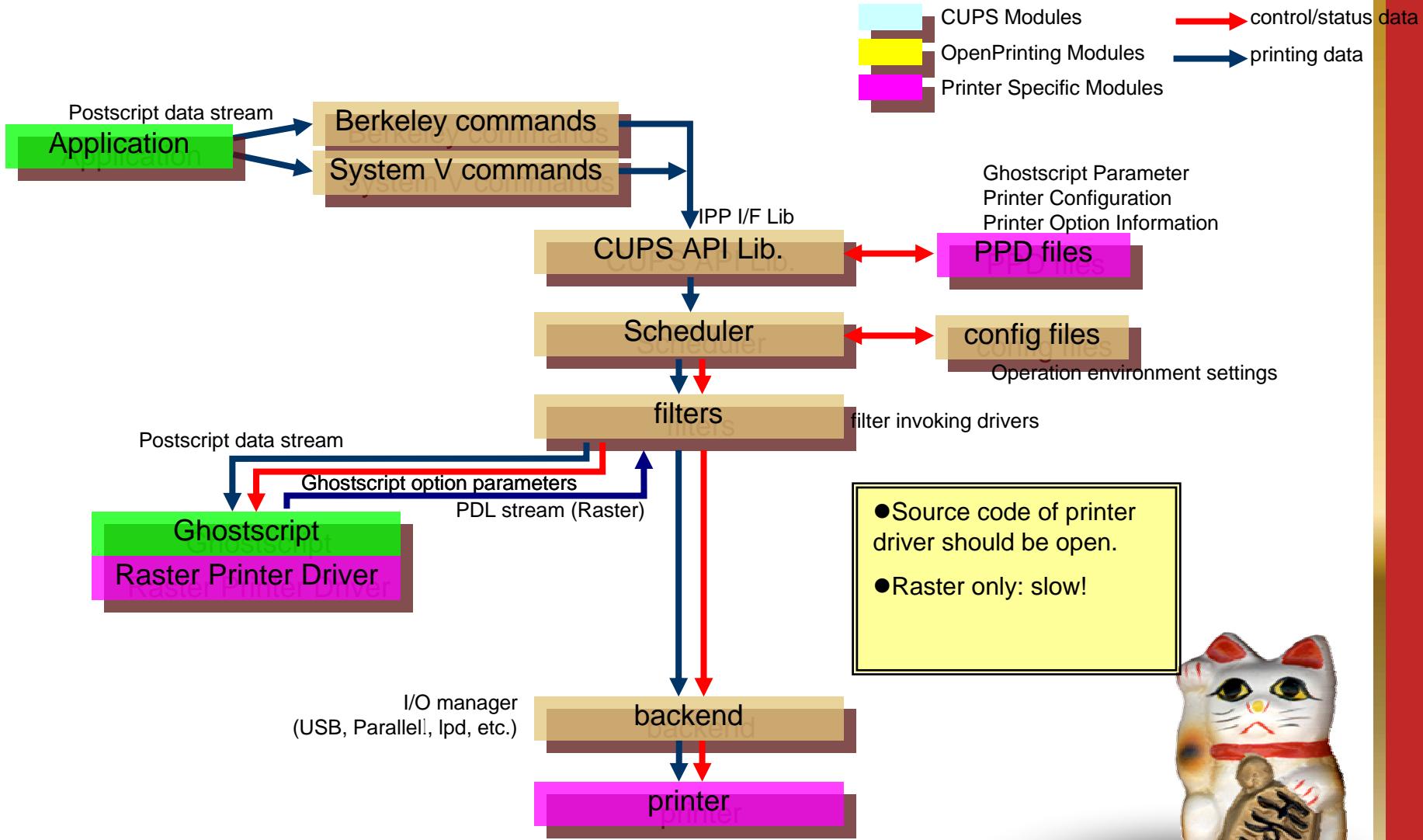
Current Status
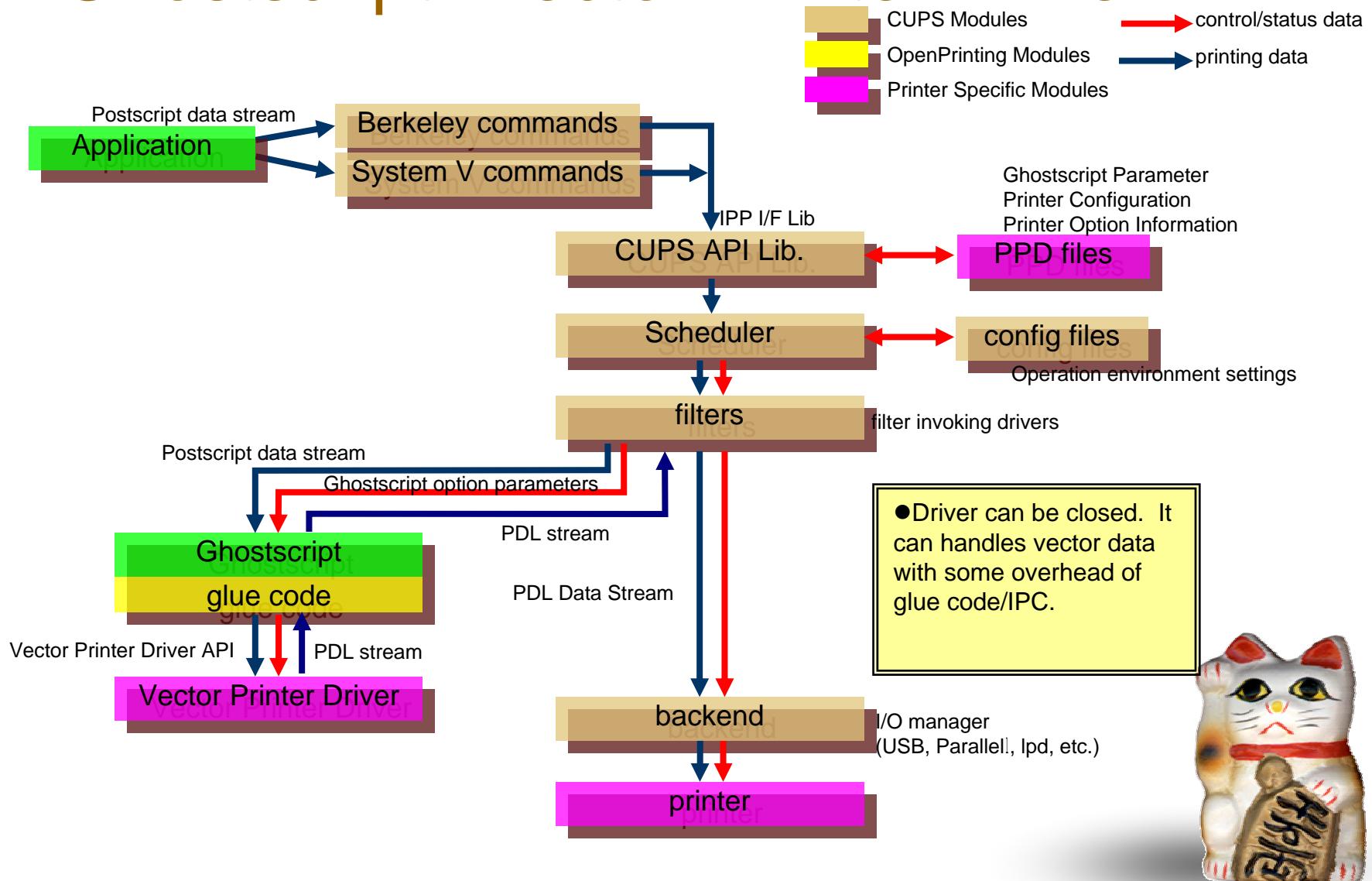
- Current Specification Version - Version 0.2
  - ftp://ftp.pwg.org/pub/pwg/fsg/vector/
- opfc implementation based on v0.2
  - Project funded by IPA
  - HP PCL5, Epson ESC/Page, Canon LIPS IV
  - Support on Ghostscript and Xprint
  - Easily ported to BSD platform
  - https://sourceforge.jp/projects/opfc/
- Current Activity
  - Device Font & Font downloading support
- To-Dos
  - Generalize Job Property and Device Capability Parameter definition
  - Small Memory Device Support (binary encoding of parameters)
  - Multiple Job for Single Driver
  - Dynamic APIEntry
  - Architecture independent data types
  - (Color Issue)
  - (formalize IPC Protocol)

Ghostscript+Raster Printer Driver

CUPS Modules — control/status data

OpenPrinting Modules — printing data

Printer Specific Modules

Application

Postscript data stream

Berkeley commands

System V commands

IPP I/F Lib

Ghostscript Parameter
Printer Configuration
Printer Option Information

CUPS API Lib. ←→ PPD files

Scheduler ←→ config files

Operation environment settings

filters — filter invoking drivers

Postscript data stream

Ghostscript option parameters

PDL stream (Raster)

Ghostscript

Raster Printer Driver

- Source code of printer driver should be open.
- Raster only: slow!

I/O manager
(USB, Parallel , lpd, etc.)

backend

printer

IPA Implementation (1): Ghostscript+Vector Printer Driver

CUPS Modules — control/status data
OpenPrinting Modules — printing data
Printer Specific Modules

Postscript data stream

Application

Berkeley commands

System V commands

Ghostscript Parameter
Printer Configuration
Printer Option Information

IPP I/F Lib

CUPS API Lib. ←→ **PPD files**

Scheduler ←→ **config files**

Operation environment settings

filters — filter invoking drivers

Postscript data stream

Ghostscript option parameters

PDL stream

Ghostscript

glue code

PDL Data Stream

Vector Printer Driver API

PDL stream

Vector Printer Driver

● Driver can be closed. It can handles vector data with some overhead of glue code/IPC.

backend — I/O manager (USB, Parallel , lpd, etc.)

printer

IPA Implementation (2): Xprint+Vector Printer Driver

CUPS Modules
OpenPrinting Modules
Printer Specific Modules

control/status data
printing data

Application

X lib/Xp lib

X Protocol

X Print Server

glue code

Berkeley commands

PDL Data Stream

Vector Printer Driver API

PDL stream

Vector Printer Driver

Parameter
Printer Configuration
Printer Option Information

IPP I/F Lib

CUPS API Lib.

PPD files

Scheduler

config files

Operation environment settings

filters

filter invoking drivers

I/O manager
(USB, Parallel , lpd, etc.)

backend

printer

URLs

- Specification
  - V0.2: ftp://ftp.pwg.org/pub/pwg/fsg/vector/
  - V0.3pre (work in progress)
    - http://omihara.hp.infoseek.co.jp/unixprint/vector/VectorPrinterDriver API-20040906.sxw

- Source Code (IPA Sample Implementation)
  - https://sourceforge.jp/projects/opfc/

- Official Drivers (sites in Japanese)
  - http://cweb.canon.jp/drv-upd/lasershot/drv_linux.html
  - http://www.epkowa.co.jp/linux/dl_OPFC.html

- IPA Project
  - http://www.epkowa3.on.arena.ne.jp/OpenPrintingProject/index_e .html