



Welcome



SavaPage

Open Print Portal

by Rijk Ravestein, Lead Developer

`rijkr@savapage.org`

Saturday • January 18 • 2020



Utrecht University



SavaPage
Open Print Portal

1980

Cognitive Psychology

1985

Software Engineer



1998

www.dataverse.nl

2011

www.savapage.org



LibrePractice
A Business Model for Free Software Practitioners

www.librepractice.org



Dataverse
A Libre Software Practice

www.dataverse.com



- **Print Management**
 - What, Why, How?
- **Issues . . .**
- **Libre Print Management**
 - Why SavaPage?
 - How does it work?
- **demo.savapage.org . . .**
- **SavaPage Community**
- **Questions . . .**



What is Print Management ?



- Tracking & Tracing



- Monitoring and control



- Pay-per-Print

€ 0.05

- Secure Pull-Printing



- Copy control





Why Print Management ?



In most cases Document Output
is the **3rd Highest Office Expense**
Behind Payroll and Rent





Why Print Management ?





Who provides the hardware ?

RICOH

nashuatec

xerox 

Canon

LEXMARK™



KONICA MINOLTA

SHARP

TOSHIBA

 **KYOCERA**





Example: Xerox-D95A-D110-D125



1

2-Tray Oversized High-Capacity Feeder*

2

250-sheet bypass tray

3

Scanner (up to 200 ipm) with standard color scanning

4

Print resolution up to 2400 x 2400 dpi

5

1,100-sheet letter-size tray

6

1,600-sheet letter-size tray

7

2x550-sheet trays standard and custom sizes up to 13 x 19.2 in.

8

Interface module

9

GBC® AdvancedPunch™*

10

High-Capacity Stacker*

11

Optional folder C-fold, Z-fold, Engineering Z-fold

12

200-sheet standard post process inserter

13

Booklet Maker Finisher
Hole punch
500-sheet top tray

14

Xerox® SquareFold® Trimmer Module



Who provides Print Management?



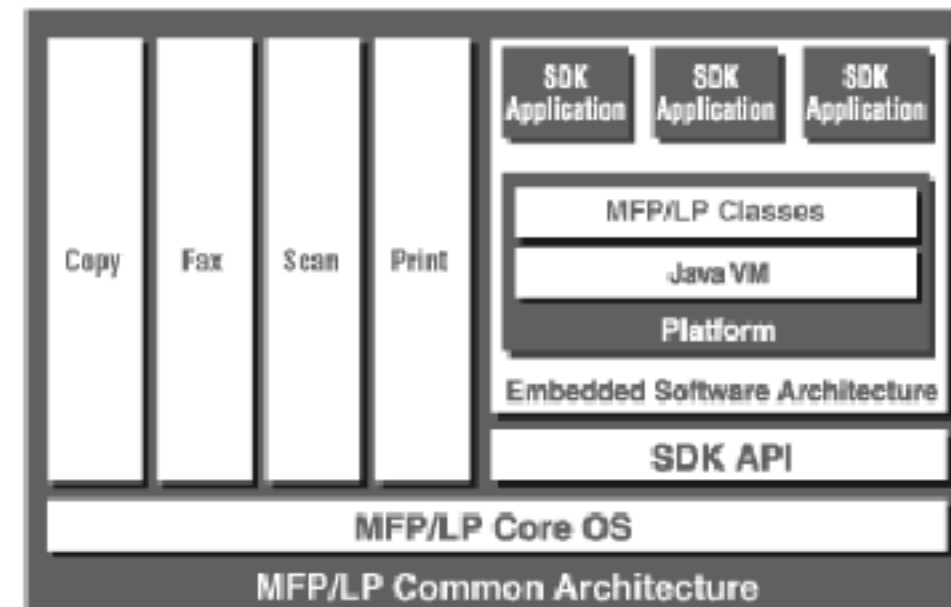


- **Print Management in the Cloud**
 - ~~Google Cloud Print~~
 - Others will fill the gap.
- **BYOD**
 - Mobile Print
 - Driverless Printing
 - AirPrint
 - IPP Everywhere
- **On Device Apps?**
 - Xerox App Gallery



- **Proprietary Devices**
 - Multi-Functionals and Copiers
 - Peripherals

- **Closed Software**
 - Embedded on SDK
 - Certification Programs
 - €€€€€





"You shall not use Open Source Software"



xerox App Gallery

Log In

Search by Name or Company

Install and manage apps on your Xerox® devices.

Create an App Gallery account now.

Business



Connect for Concur
Xerox Corporation



Connect for DocuSign
Xerox Corporation



Connect for Exchange Online
Xerox Corporation



Connect for NetSuite
Xerox Corporation



Connect for XMPie
Xerox Corporation
Free



Ecobox DE DK FI UK SE
TRC Knowledge Management

xerox App Gallery

Log In

All Apps / Connect for Moodle

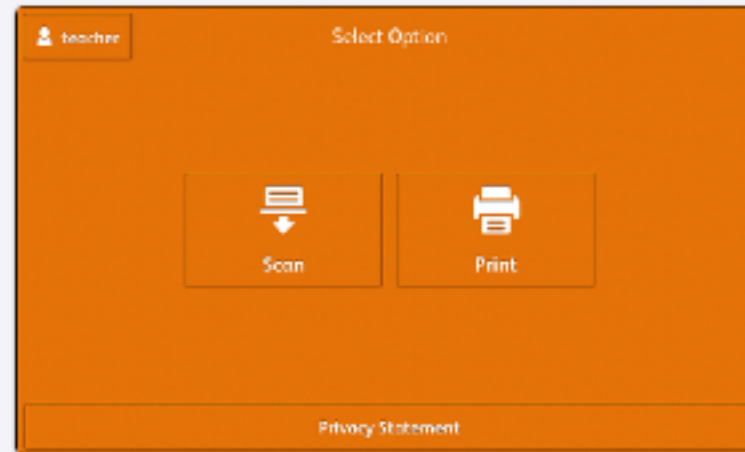


Connect for Moodle
Xerox
Version: 1.0
Published: 5/29/2014

Price Per Device
1 Year - \$199.00

Try It

Subscribe



XEROX SDK LICENSE AGREEMENT

<https://www.xerox-solutions.net/developers/application.php>

6. **You shall not use Open Source Software** including without limitation software licensed under the GNU General Public License ("GPL"), the Mozilla Public License ("MPL") or the IBM Public License ("IPL"), in connection with Applications if such use may: (i) create, or purport to create, obligations of Xerox with respect to the SDK; (ii) grant, or purport to grant, to any third party any rights to, waivers of or immunities under Xerox' intellectual property or proprietary rights; and/or (iii) cause, or be interpreted or asserted to cause, the SDK in whole or in part or any modifications or enhancements to the SDK to become subject to the terms of the GPL, MPL or IPL or other Open Source Software license.



We Need Software to Help Us Slow Down, Not Speed Up

Speed often improves life. But the recent techlash has been driven in a fundamental way by the grim side effects of this acceleration.



71458 14748



Is there an alternative ?



Enter SavaPage . . .

SavaPage is a Free Print Portal Solution that uses Open Standards and Commodity Hardware for Secure 🌐 **Pull-Printing**, Pay-Per-Print, Delegated Print, Job Ticketing, Auditing and PDF Creation.

SavaPage is 🌐 **OSI Certified Open Source Software**: you can redistribute it and/or modify it under the terms of the 🌐 **GNU Affero General Public License (AGPL)** as published by the 🌐 **Free Software Foundation**, either version 3 of the License, or (at your option) any later version.



Welcome



Welcome to SavaPage! Our community unites people who are interested in Open Printing in general and [SavaPage Open Print Portal](#) in particular. The mission and vision of our journey is as follows:

Mission Produce Open Printing Solutions with Free and Open Source Software.

Vision A World where People & Planet enjoy a sustainable Open Printing Experience.

You are cordially invited to sign up to our [Community Forum](#). If you installed SavaPage Open Print Portal as part of your printing solution, you are invited to subscribe to our software as [Community Resident](#).



What about openprinting.org ?



Printer Database

OpenPrinting's Printer Database

[Browse](#)



Printer Driver Database

OpenPrinting's Printer Driver Database

[Browse](#)

- works on the development of new printing architectures, technologies, printing infrastructure, and interface standards for Linux and UNIX-style operating systems.
- collaborates with IEEE-ISTO Printer Working Group (PWG) on IPP projects.
- is working with SANE to make IPP scanning a reality.
- maintains cups-filters which allows CUPS to be used on any Unix-based (non-macOS) system.
- is responsible for the Foomatic database.
- is working on Common Print Dialog Backends project.



- **Common features**

- Tracking & Tracing, Pay-Per-Print, Secure Pull-Printing
- Driver Print, Web Print, Mail Print, Android, AirPrint, ~~Google Cloud Print~~
- Job Ticketing, Document Archiving, Printer SNMP, GDPR compliant
- LDAP, Active Directory, NFC, Internationalization, and more . . .

- **Unique features**

- Delegated Print, PDF/PGP Verification, PGP/MIME
- Plug-ins: OAuth, Payment, Notifications, IPP Routing
- Corporate Virtual Printer + PDF Creator
- GNU/Linux, AGPL, Open Standards, Commodity Hardware
- Supports all Client Platforms & Mobile Devices



Why SavaPage ?

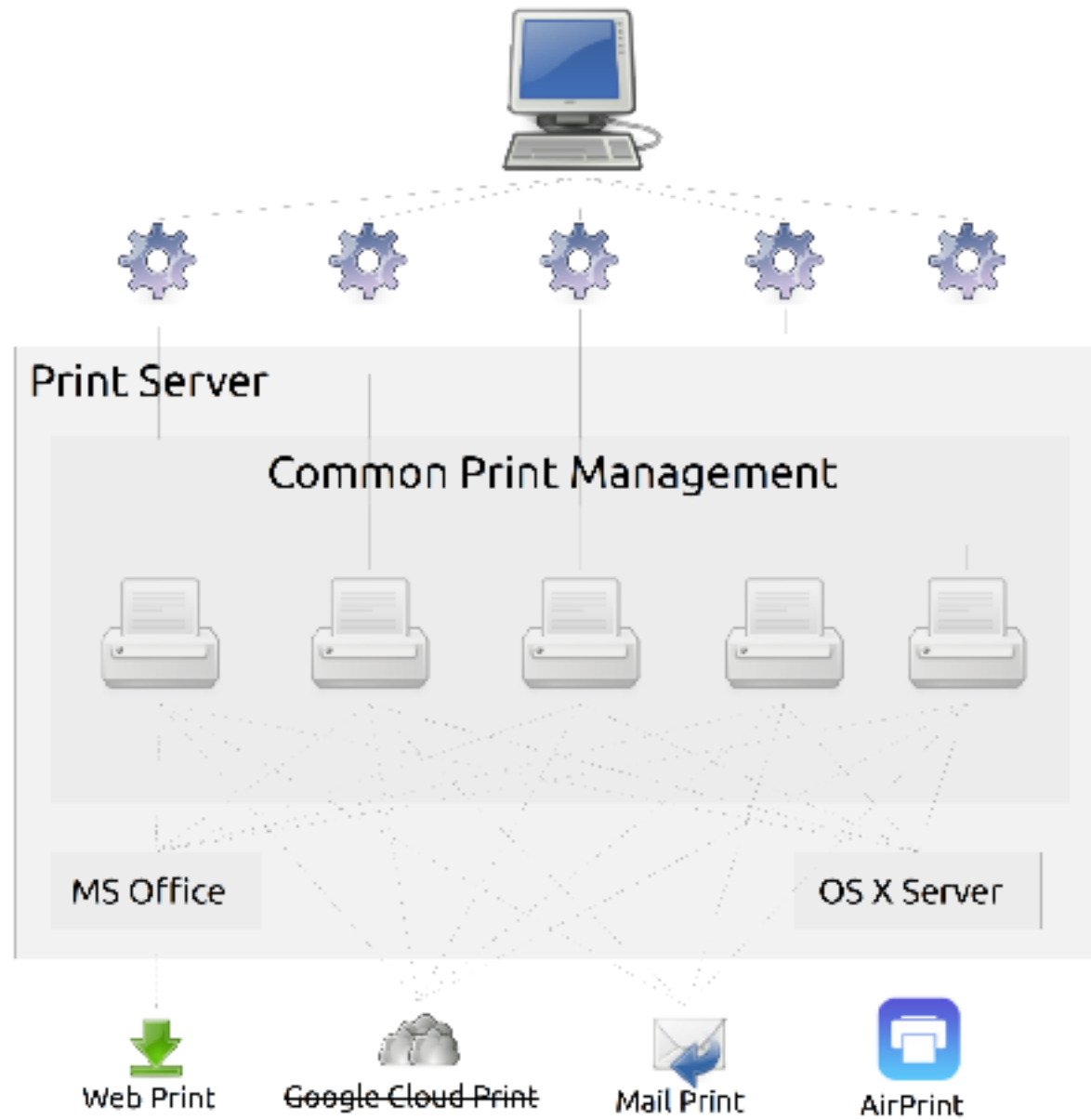


And yes, you can use it @home



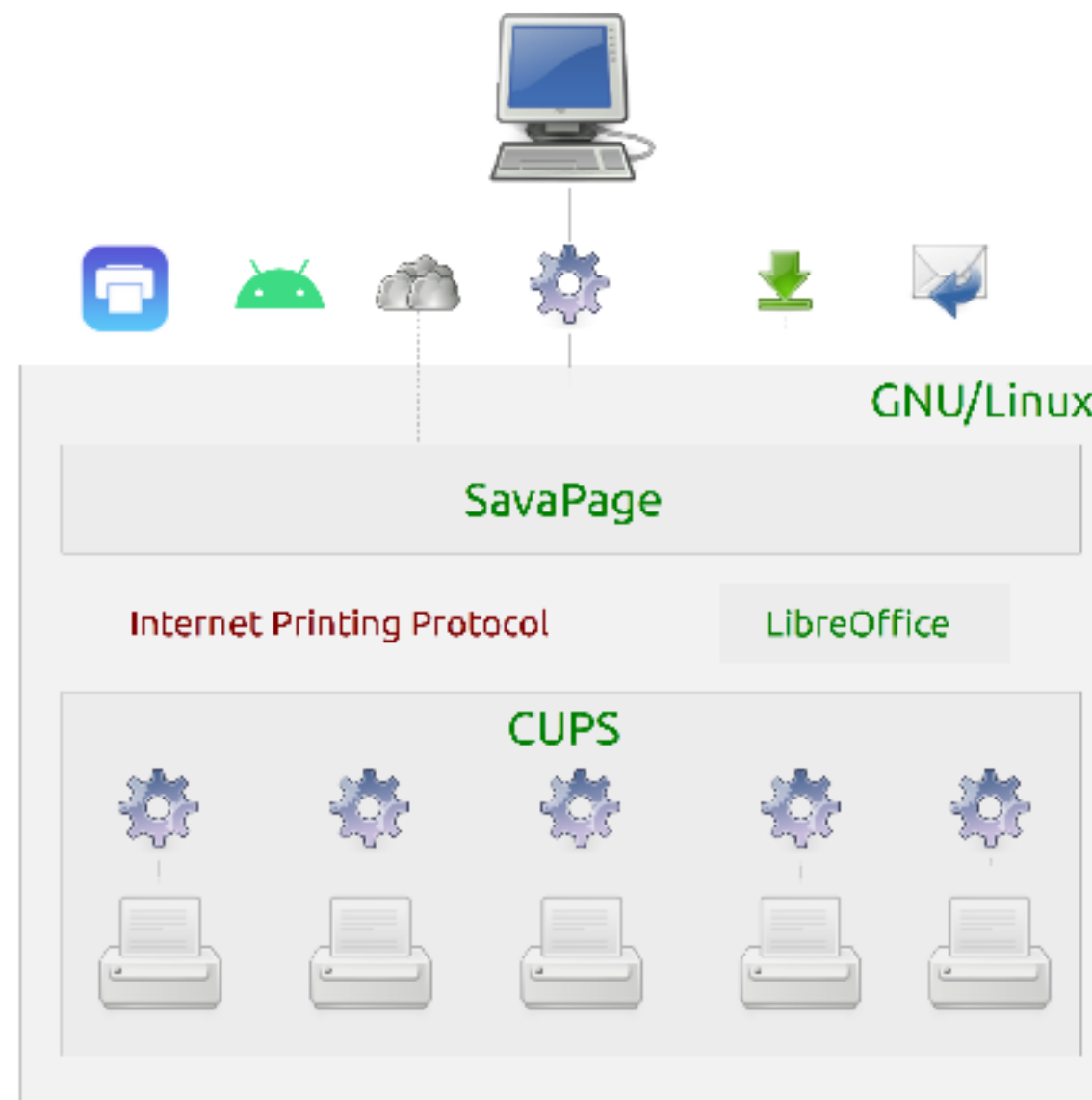
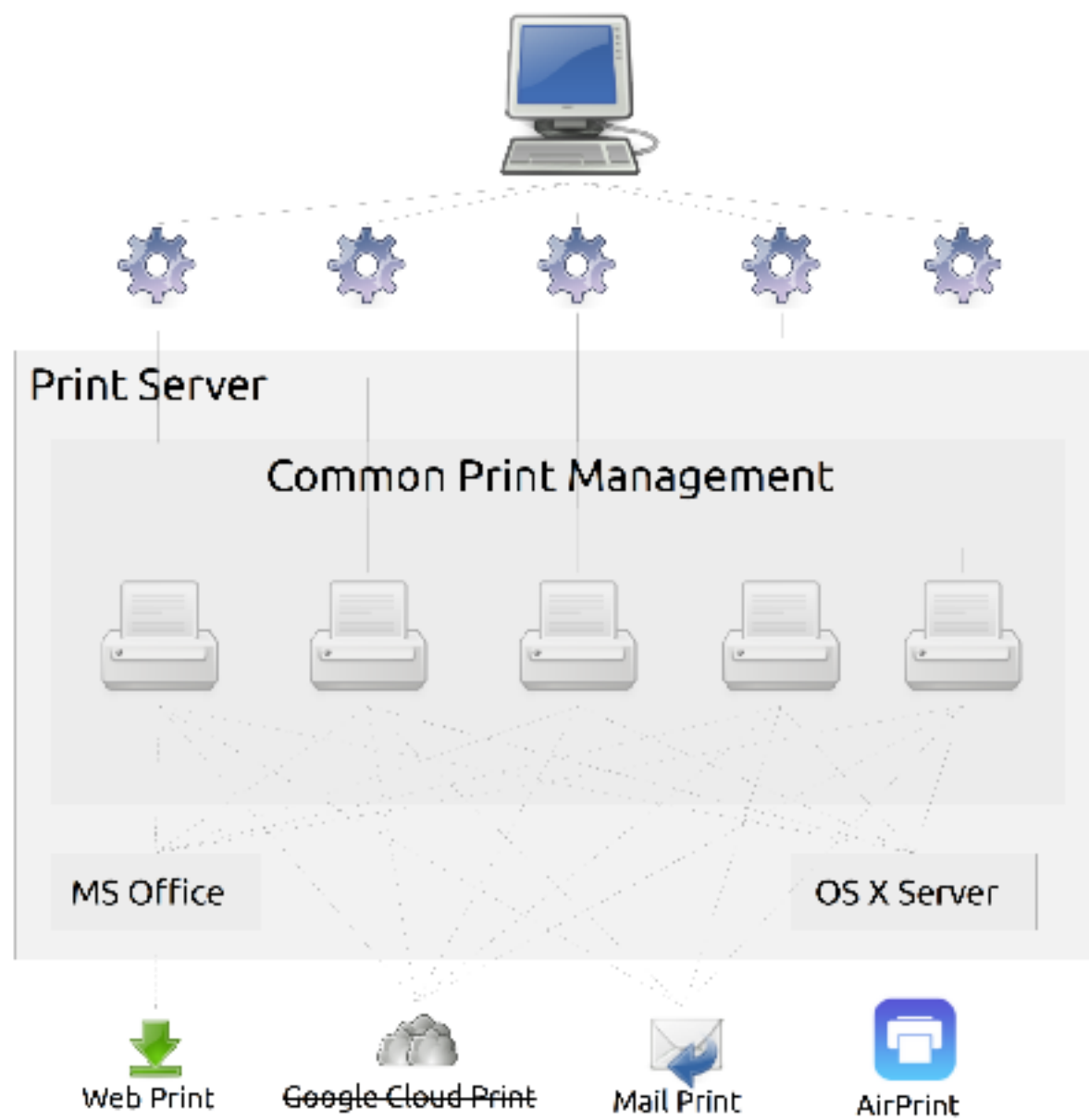


How does SavaPage work?





How does SavaPage work?





Step 1: Print

Printer Properties - 'SavaPage' on localhost

Settings Policies Access Control Printer Options Job Options Ink/Toner Levels

Settings

Description: SavaPage

Location:

Device URI:

Make and Model:

Printer State:

Tests and Maintenance

Printer

RECENT PRINTERS

SavaPage ✓

Login to SavaPage App before printing.

Upload File

Supported Documents
Microsoft Office, OpenOffice, LibreOffice, RTF, PDF, PS, XPS, HTML, TXT

Supported Graphics
BMP, GIF, JPEG, PNG, SVG, TIFF

Max File Size
5 MB

Font for plain text

No file chosen

Mail Print

Allow users to mail documents

IMAP

Host:

Port:

User Name:

Password:

Inbox:

Trash:

Print & Fax

Printers

- SavaPage
- Apple Laser Writer

SavaPage

Location:
Kind: SavaPage, 0.9.0
Status: Idle

Share this printer on the network



Internet Printer

Use this URL to print over public internet:

`ipps://example.com/printers/Internet/user/1111/uuid/0e655217-b25b-4dd2-9fad-21726ebf3d69`

Google cloud print beta

Owned by me



Step 1: Print (Android)

Internet Printer

URLs and drivers to securely print over public internet

CUPS
`ipp://example.com/printers/internet/user/1111/uuid/a71a34ce-587f-403a-b5ed-6a3a92a5ef93`

SAVAPAGE.ppd

Windows
`https://example.com/printers/internet/user/1111/uuid/a71a34ce-587f-403a-b5ed-6a3a92a5ef93`

Use any PostScript driver from the printer list.

ANDROID GET IT ON F-DROID

URL `https://example.com`

User `rijk`

UUID `a71a34ce-587f-403a-b5ed-6a3a92a5ef93`

UUID Back

SavaPage Print Service

pampus-dev

demo.savapage.org

Printer
pampus-dev

`https://192.168.1.35:8444`

rijk

`3507ed47-997a-420f-9da4-7a0b22f28f11`

CANCEL DELETE SAVE

+

8:35

pampus-prd SO A4

Save as PDF

demo.savapage.org

pampus-dev

All printers...

Address: Koninkrijk 30
1102 CA, Almere
The Netherlands

Phone: +31 36 5439 800

URL: https://www.sava.org

Bank: Trade Bank N.V.
Account: 44 00 3400375 000 00
IBAN: NL00 3400 3750 0000 00

Bank: Rijksoverheid

Product: Rijksdienst voor Ondernemend Nederland

Product: rijksdienst voor Ondernemend Nederland

Default: rijksdienst voor Ondernemend Nederland

Loading page: www.sava.org

We offer (Dutch) users access to our Open Print Portal (Open Print Portal) under the SavaPage Community with:

- Software: SavaPage Open Print Portal (SavaPage Open Print Portal)
- Hardware: SavaPage Open Print Portal (SavaPage Open Print Portal)
- Services: SavaPage Open Print Portal (SavaPage Open Print Portal)

We offer (Dutch) users access to our Open Print Portal (Open Print Portal) under the SavaPage Community with:

Call for Contributions: we are looking for Services to support the SavaPage Community

Member of: Open Print Portal (Open Print Portal)

Source: Last modified: 2019/04/11 17:19:48

1/1



Step 2: Login Web App

Welcome to SavaPage

Please login to start the application.

User Name

Password

Login

[About](#) [La...](#)

Language

Select your language:

- Deutsch
- English
- Français
- Español
- Polski
- Русский
- Nederlands

Welcome to SavaPage

Please login to start the application.

ID Number

PIN

Login

Login with

Please login to start the application.

Login with

Host

Port

Use SSL

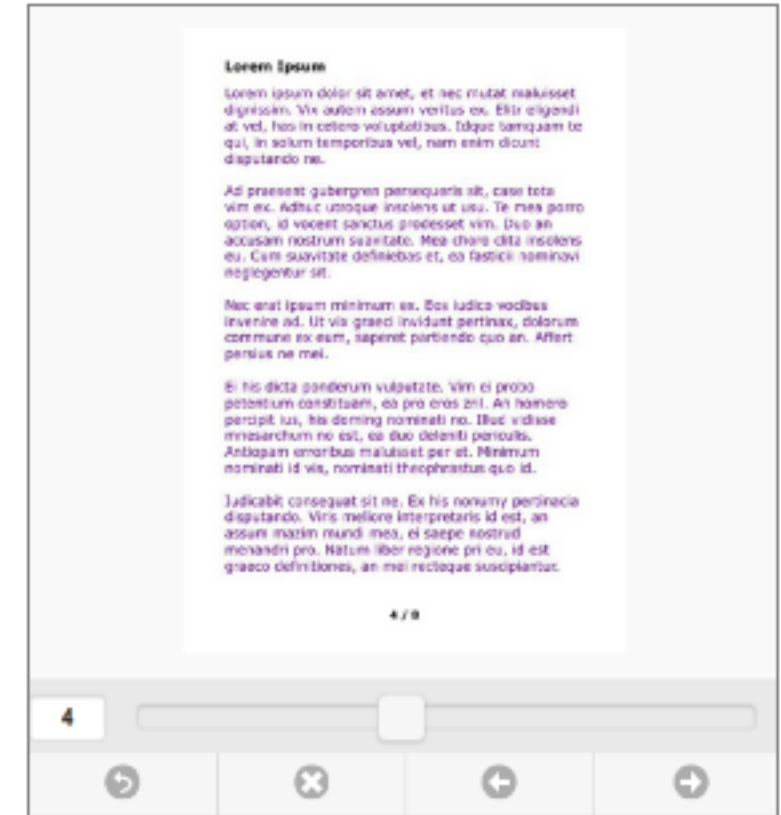
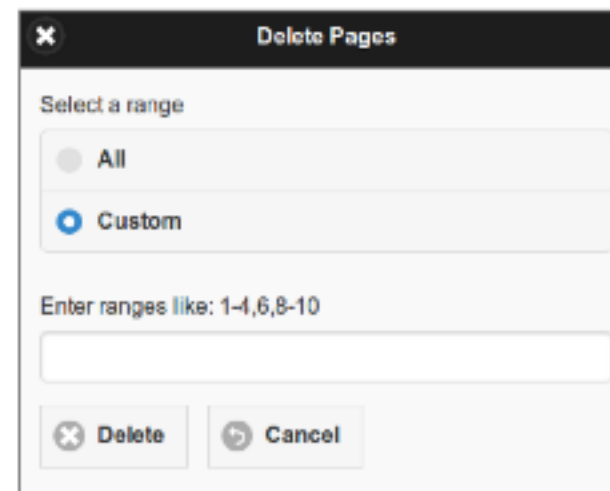
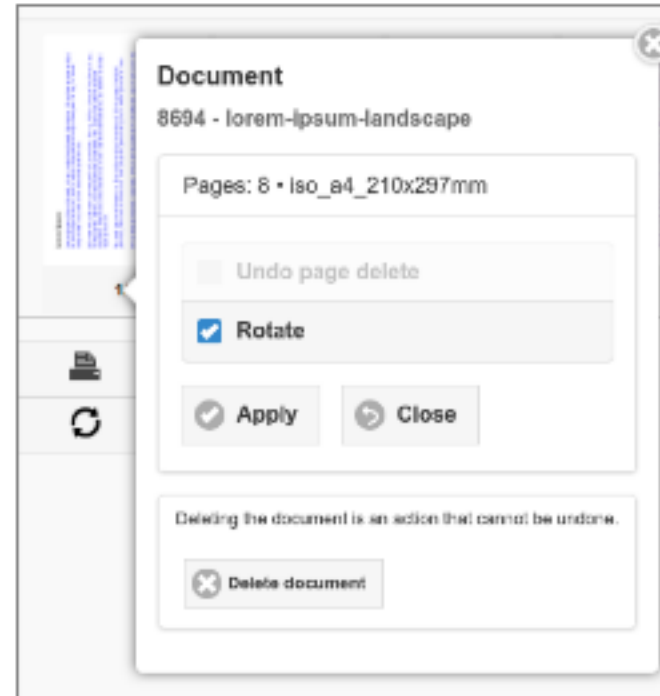
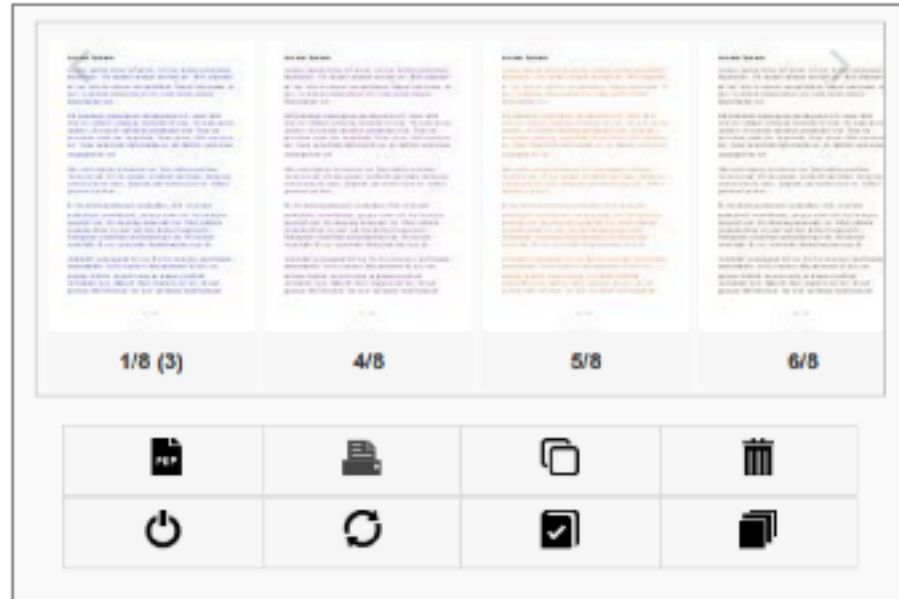
Base DN

Admin DN

Admin password



Step 3: Preview, edit...





Step 4a: Save as PDF

PDF

Scope -

Title

Author Rijk Ravestein

Pages

Letterhead -

Eco Print

Remove graphics

Description Security Passwords

+ Description

+ Security

+ Passwords

Download Send Default Back

Scope lorem-ipsium.odt

Title tiger.svg

Description

Subject SavaPage Demo

Keywords test demo example

Passwords

User Password

confirm

Owner Password

confirm

Security

Sign

Encryption

Actions allowed

Printing

Degraded Printing

Page Extraction

Commenting

Document Assembly

Content Copying

Content Copying for Accessibility

+ Allow all - Allow none



Step 4b: Proxy Print

Print

Printer

A4 A3

floor

- XEROX-WORKCENTRE-5890 • 1st Floor
- Ricoh Aficio MP C7500 PS • 2nd Floor **Fast**
- DELL-5100CN • 3rd Floor

Fast Print Closing Time 17:20:12

Back

Ricoh Aficio MP C7500 PS

A4 A3 1 Default Landscape

Media Source Automatic

Double-sided printing Two-sided (long edge)

Color Mode Color

Resolution 600x600 DPI

Rotate by 180 degrees Off

Pages per side 1

Back Invoicing Job

A4 A3 A4 A3

Page Scaling None **Fit**

Media Source A4

Double-sided printing One-sided Two-sided (long edge) Two-sided (short edge)

Color Mode Grayscale



Step 4b: Eco Print (1)

Job

Scope

Title

Copies

Pages

Letterhead

Eco Print • 15% discount

Remove graphics

Collate

Delete all pages after printing

Lorem ipsum dolor sit amet,

Lorem ipsum dolor sit amet,

Lorem ipsum dolor sit amet,



Step 4b: Eco Print (2)

Job

Scope

Title

Copies

Pages

Letterhead

Eco Print • 15% discount

Remove graphics

Collate

Delete all pages after printing

滴 雀 糊 縫 鹿 塔 滑 圓 浮,

滴 雀 糊 縫 鹿 塔 滑 圓 浮,

滴 雀 糊 縫 鹿 塔 滑 圓 浮,



Step 5: Print Release

lorem-ipsum

Your print job is held for authentication. ⁸

€ 0.1500

Swipe your card to release ...

Cancel

Enter ranges like: 1-4,6,8-10



Hold Print Jobs

Print Room
lorem-ipsum.odt

146-9E14-ACB5 • 2018-02-23 21:10 • 2018-02-24 14:00 • 8 Pages, 12 Copies (48 Sheets) • Grayscale • A4 • Duplex • Portrait • Collate • € 3.84 • Klas.1B1 € -3.20 (10) • Klas.1A2 € -0.64 (2)

White binding

Public Printer
lorem-ipsum.txt

2018-02-23 21:08 • 2018-02-23 22:08 • 2 Pages, 2 Copies (2 Sheets) • Color • A4 • Duplex • Portrait • Collate • Eco Print • € 0.24 • Personal € -0.24 (2)

Cancel all Extend Back

0:57 2 100 € 4.08

Proxy Print Authentication

Print Mode

Fast

Hold

Direct

Fast + Hold

Fast + Direct

Target
Single Printer
XEROX-WORKCENTRE-5890

Printer Group
XEROX

NFC Card Number
HEX DEC **LSB** MSB

OK Delete Cancel



Step 6: Recharge account

Point of Sale

Deposit Receipts

Enter the username and select an amount to add to the account.

User ID

Amount
 € . Balance €15.00

Payment method

Comment

Receipt

Deposit Clear Back

Manual transaction • D000022 4/23/14 3:28 PM rjk

€20.00 • €5.00 • Credit Card
 VISA card

Receipt

Pre-Paid Print Card

EUR 5.00

A-1503-0797-8523-0567-9607

Use before December 31, 2015

Issued by Dataverse B.V.

Redeem Voucher

All requests to redeem vouchers are logged.

Number

Redeem Back

Redeem Voucher 9/8/15 1:23 PM rjk

EUR 6.41 • EUR 5.00
 Redeemed voucher "A-1503-0797-8523-0567-9607".

Financial

Balance EUR 4.55

Credit limit EUR 10.00

Voucher Transfer

Use an external account to increment your balance:

Transfer Money

Transfer money from ideal.
 Minimum amount EUR 0.55
 EUR 0.45 cost is charged to your account.

EUR .

Start Back

ideal 6/2/15 4:30 PM [system]

EUR 60.25 • EUR 4.55 • TESTNL99
 NL17RABO0213698412 • tr_1BkJAKmqrR
 SavaPage tegoed voor rjk.
 • EUR 5.00 -/- 0.45 • T. TEST

Bitcoin

To pay with Bitcoin please send to:

9FgdrqYW7fsdd5UWnGlpJ2KcnMou8eVgF

This address is for one-time use. A second payment at this address is not accepted.

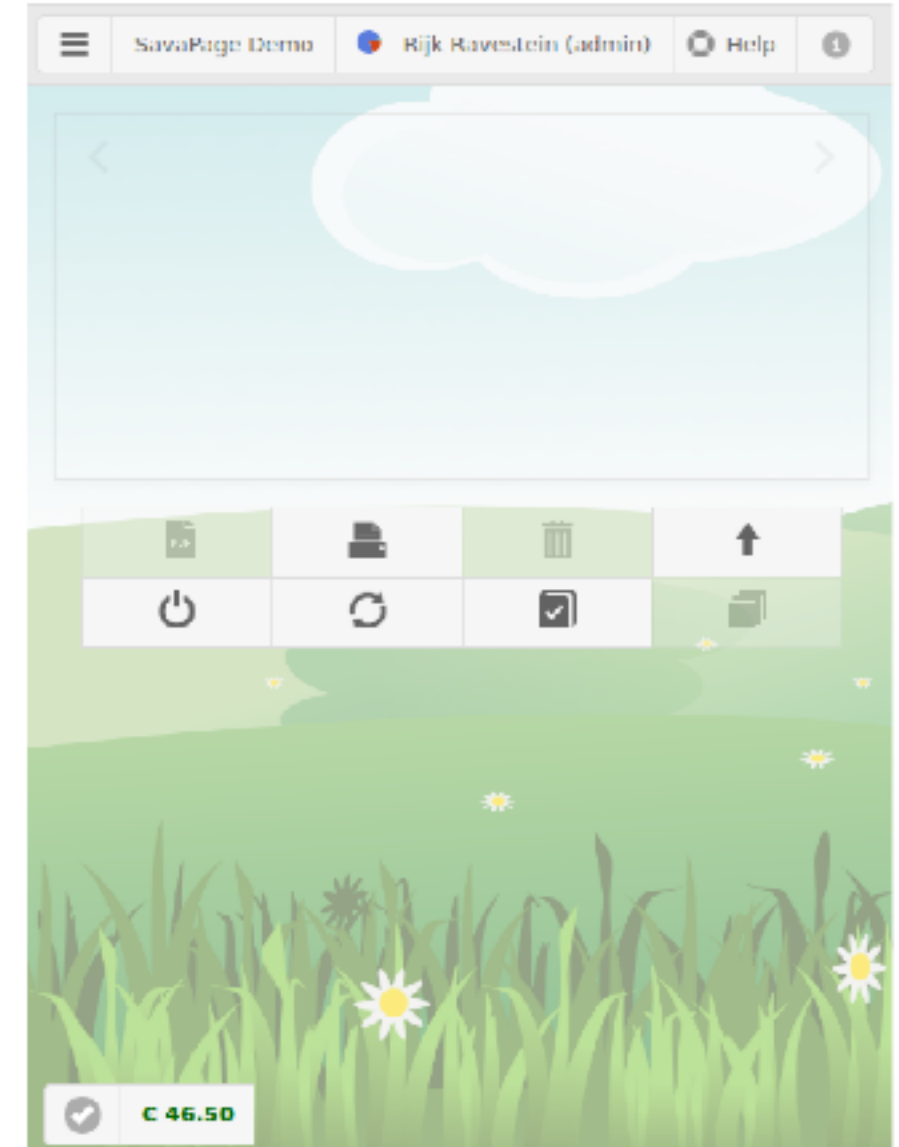
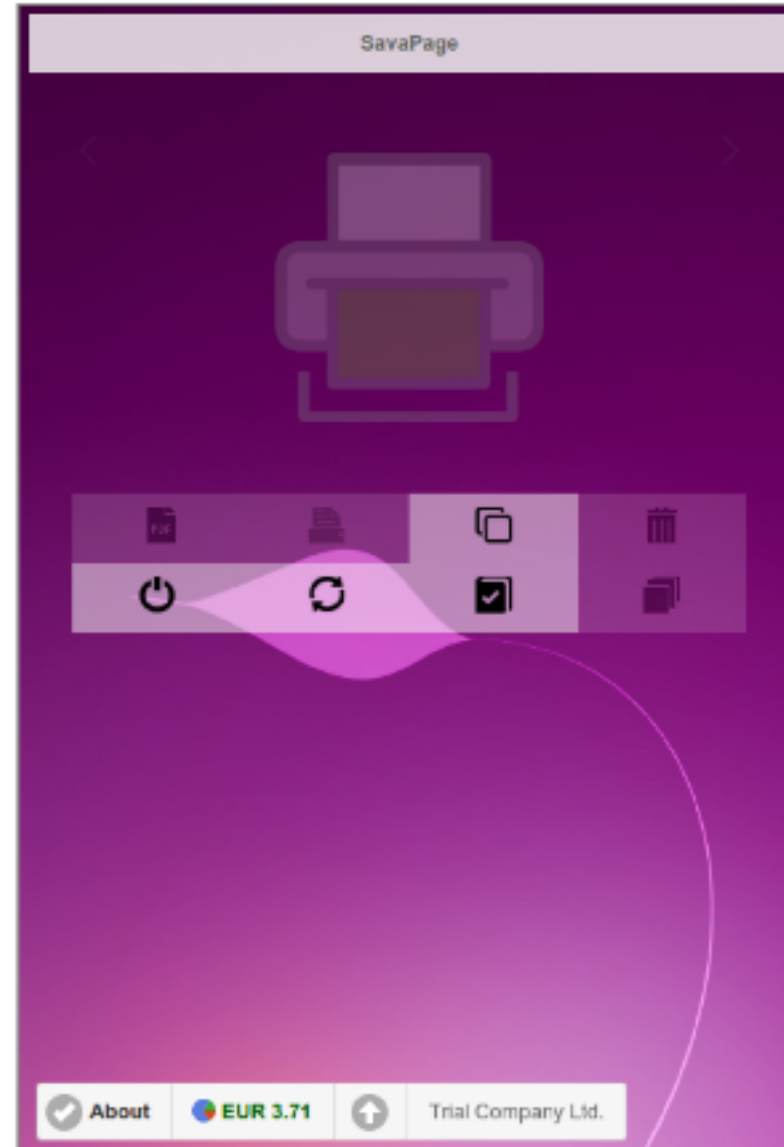
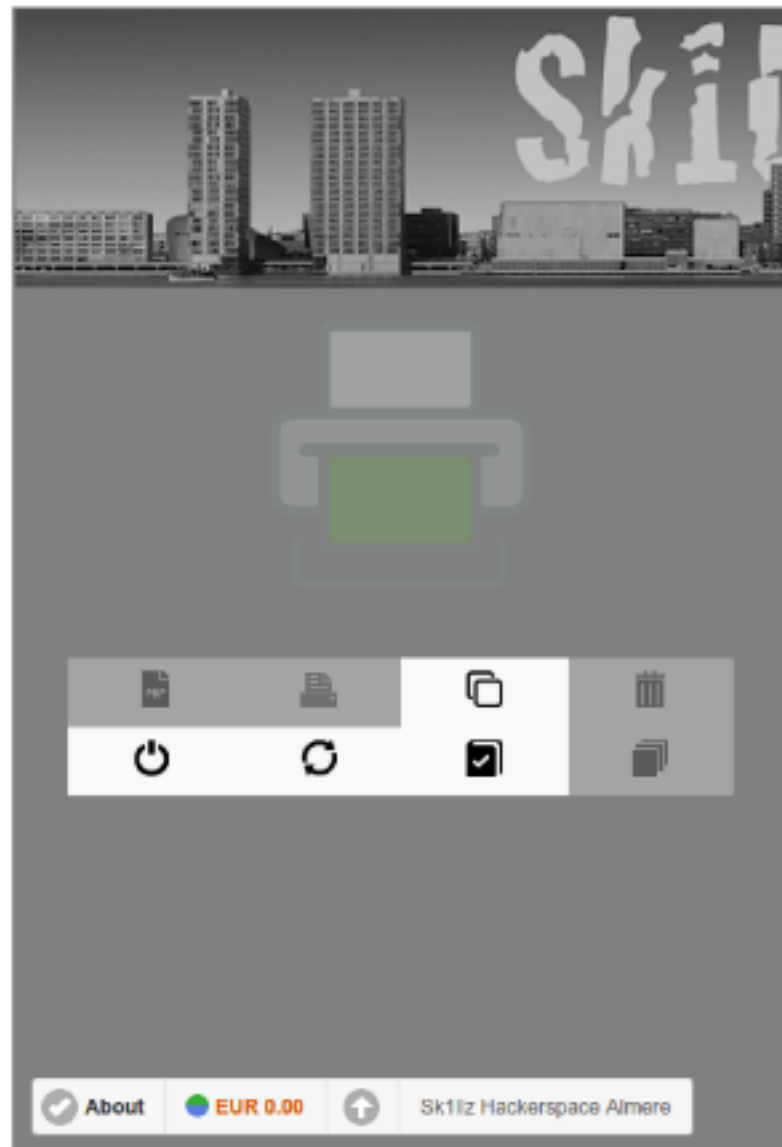
Start Back

bitcoin 6/15/15 4:57 PM [system]

EUR 4.86 • EUR 0.83 • 96212_82710 • 0.00400000



Customize





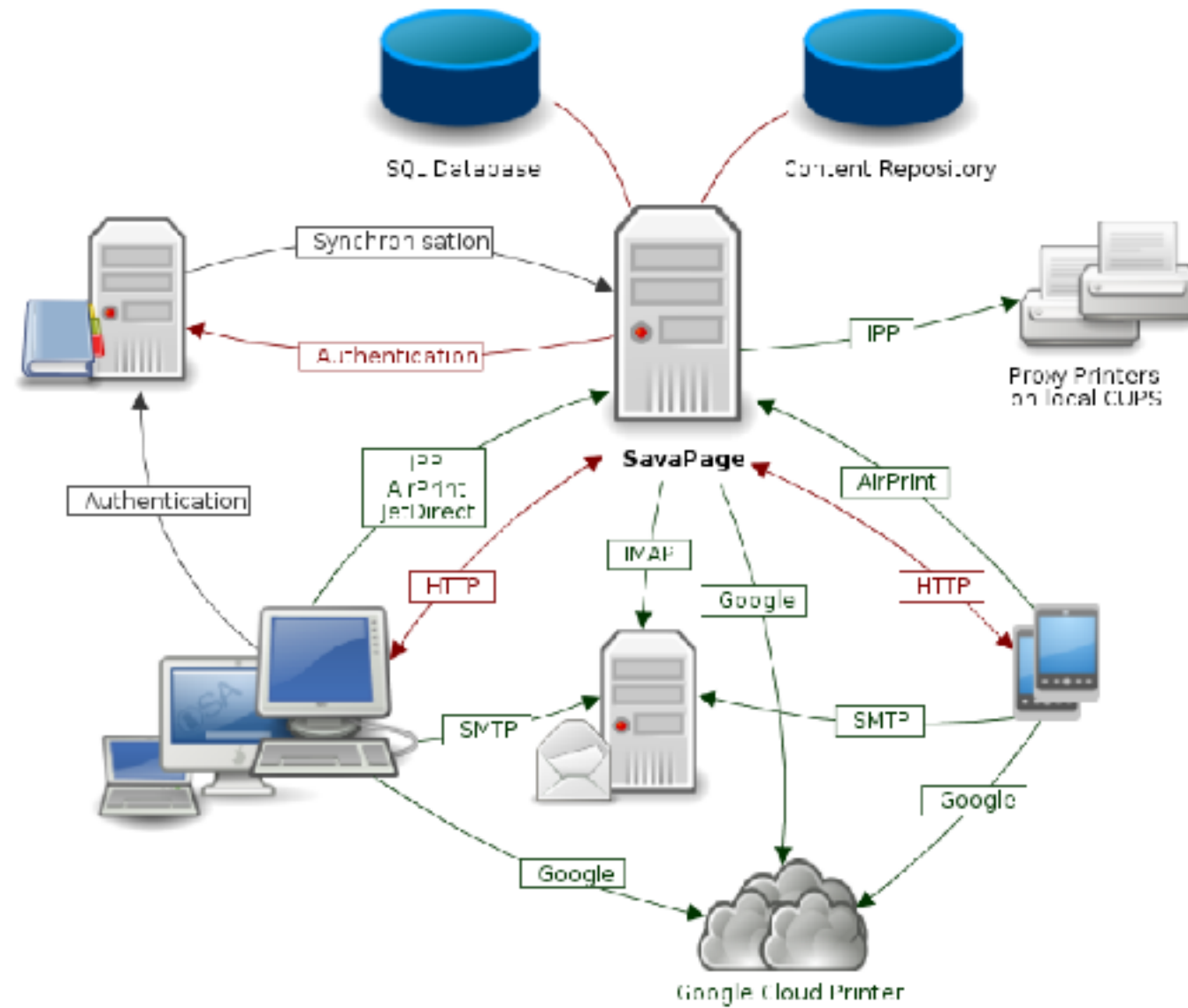
Demo




<https://demo.savapage.org>



Behind the scenes







SavaPage

Open Print Portal Services

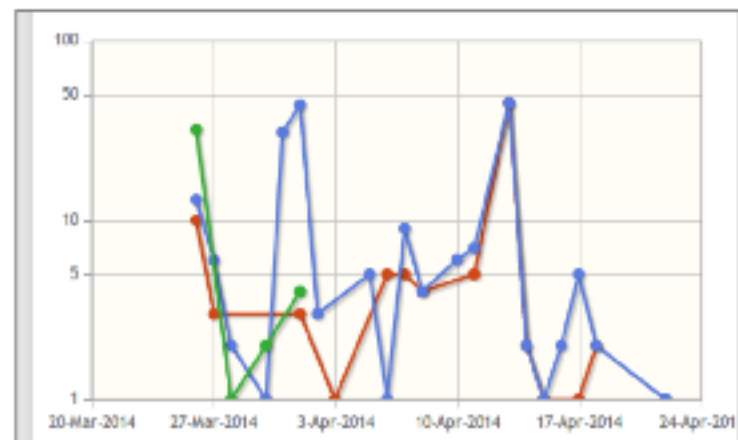
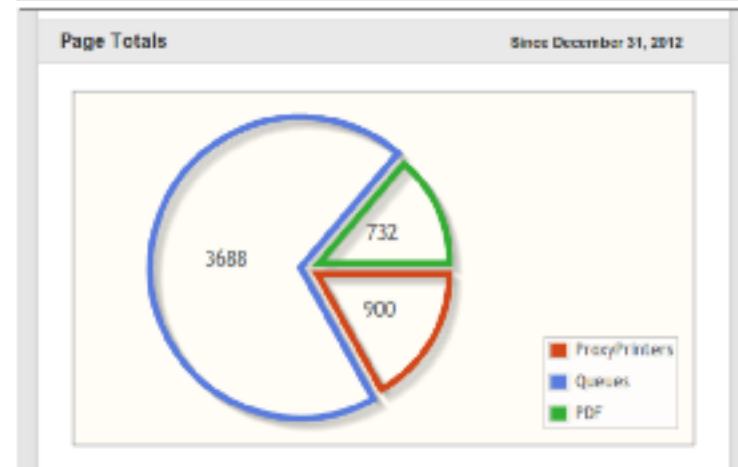
Welcome. This is the place for administrators to configure and consult the SavaPage environment.

- Dashboard ⓘ
- Users 👤
- Groups 👤
- Accounts 🔑
- Queues ⚙️
- Proxy Printers ⚙️
- Devices ⚙️
- Options ⚙️
- Documents 📄
- Log ⚠️
- About ⓘ
- Logout 🔌

🏠
🔍
📄
☰
SavaPage Demo
beheerder

Environmental impact

Paper	1,495 SU
Trees	17.941%
CO ₂	7.62 kg
Energy	0.019 kW-h



Dashboard

Community member SavaPage Demo

Membership Cardholder

Participants 500

Valid till January 27, 2020

Days remaining 294

Mode Production

Status Ready to use

Uptime 4m

Users 38

Client sessions 2 (0) • web (client)

Recent errors 0

Recent warnings 0

SSL valid till May 14, 2019

- Documents ⓘ
- Vouchers ⚙️
- Log ⚠️
- Point of Sale 📄
- About ⓘ
- Configuration Editor ⚙️
- Logout 🔌
- User Manual 📖
- savapage.org ⓘ

Real-time Activity

```

10:19:39 | Users successfully synchronized.
10:19:39 | Files: present [200.1 kB]
10:19:39 | Users: identical [4] added [0] updated [0] non-exist [0] internal [5]
10:19:39 | Synchronizing [4] users with [9] in database
10:19:39 | Starting user synchronization...
  
```

Clear



Queues

Select and Sort

New

1 1

trusted

IPP Printer (reserved)
 ipp://192.168.1.35:8632/printers/
 192.168.1.0/24
 Dec 31, 2012 ~ Nov 14, 2015
 1,922 jobs, 4,939 pages, 1.4 GB

/airprint **untrusted**

AirPrint (reserved)
 Apr 4, 2013 ~ Aug 15, 2015
 54 jobs, 243 pages, 155.6 MB

Proxy Printers

Select and Sort

CUPS **Synchronize**

1 1

HL-1430-SERIES
 HL-1430-SERIES
 Jan 3, 2013 ~ May 21, 2013
 229 jobs, 243 pages, 251 sheets

HL-2030-SERIES
 HL-2030-SERIES
 Jan 3, 2013 ~ Jan 11, 2015
 495 jobs, 975 pages, 950 sheets, 111.1 MB
 Member of Group: SECURE
 ← PI • Fast • Hold

Cost per media side

Use B/W as default

Source	One-sided	*Two-sided	
*auto	B/W	Color	*Color
<input checked="" type="checkbox"/> top	0.0500	0.1000	0.0300
A4 - white		A4	

Devices

Select and Sort

New Terminal **New Card Reader**

1 1

CARD-READER-PAMPUS **active**
 → PAMPUS
 192.168.1.35:7772 • Next to PAMPUS terminal
 Disconnected: Jan 13, 2015 5:39:27 PM

CARD-READER-RPI **active**
 192.168.1.200:7772 • Raspberry PI @ Xerox
 Connected: Jan 13, 2015 5:39:27 PM
 Proxy Print • Fast • Hold • Single Printer • XEROX-WORKCENTRE-5890

PAMPUS **active**
 → CARD-READER-PAMPUS
 192.168.1.35 • Meeting room

PUNTER **disabled**
 192.168.1.36 • Steven's desktop
 Proxy Print • Printer Group • BROTHER (HL-2030-SERIES, HL-1430-SERIES)



- **Just-in-time print-spooling**
 - Spool files can be huge, held jobs use a lot of disk space
 - Job options are lost or irrelevant when spool file is moved to another queue
 - Original PDF + job options are held/released
 - Jobs need not be moved to a native release queue
 - Jobs options are retained
- **Print Preview**
 - **Mindless printing**
 - Print preview, concatenation, editing, letterheads
 - PDF Creation, *“why print when you can save-a-page”*
 - Save ink and toner with Eco Print and graphics filter



- One front-end printer
 - Multiple printer drivers on Windows desktop (bloatware)
 - One Generic Postscript Driver
- SSL printing
 - Sniffing print jobs and replaying them
 - <http://www.irongeek.com/i.php?page=security/networkprinterhacking>
 - IP printing on port 9100
 - `ipp://savapage:8632/printers` (or `https`)
 - Proxy printer connections are sand-boxed and centrally guarded
 - Printers in VLAN
- Minimal hardware requirements
 - 2 CPU cores, 2 GB RAM, 8 GB+ HDD, virtual machine compatible



- **PostScript Printer Description (PPD)**

- Files created by vendors to describe features and capabilities available for their PostScript printers.

- **CUPS-PPD**

- CUPS extended the PPD concept to allow for PostScript printing to non-PostScript printing devices, by directing output through a **CUPS filter**.
- A **chain of filters** converts print data to Page Description Language (PDL)
 - A **backend** sends this data to the print device

- **IPP -> CUPS**

- Get-Printer-Attributes Operation
- <https://www.pwg.org/ipp/ipp-registrations.xml>
- **Vendor PPD options != IPP Keywords/Attributes**



- PPD to IPP Mappings
- PPD Rules
- IPP Rules

– SPConstraint

```
*VENPrintColorMode print-color-mode
*VENPrintColorMode *VENMonochrome monochrome
*VENPrintColorMode VENCOLOR color
```

```
*SPSubst/sheet-collate/collated: staple-and-collate \
  org.savapage-finishings-staple/!3 \
  *StapleCollate
```

```
*SPExtra/org.savapage-finishings-punch/74: punch-dual-left \
  *CNPunch/Left
```

```
*SPConstraint: transparency-two-sided \
  media-type/transparency \
  sides/!one-sided
```

– Cost Rules for Media, Sheet, Copy, Set

```
*SPJobTicket/Media/Cost: 0.0430 white-A4-080-S \
  media type/ext.paper 80 \
  media-color/white \
  media/iso_a4_210x297mm \
  sides/one-sided
```

```
*SPJobTicket/Sheet/Cost: 0.5000 laminate-A4 org.savapage-finishings-ext/laminate \
  media/iso_a4_210x297mm
```

```
*SPJobTicket/Copy/Cost: 0.5000 folder-A4 org.savapage-finishings-ext/ext.folder \
  media/iso_a4_210x297mm
```

```
*SPJobTicket/Set/Cost: 0.05 banner-A4 org.savapage-job-sheets/!none \
  org.savapage-job-sheets-media/iso_a4_210x297mm
```




- Internal IPP Extensions

- External IPP Extensions

Attribute	Value	Name	Syntax	Reference
org.savapage-finishings-jog-offset	3	none	1setOf type2 enum	RFC8011
org.savapage-finishings-jog-offset	14	EachSet	1setOf type2 enum	PWG5100.1

```
*SPJobTicket/Copy: org.savapage.ext-myoption \ ❶  
  *none ext.choice-1 ext.choice-2  
  
*SPJobTicket/Copy/Cost: 0.1000 myrule-1 \ ❷  
  org.savapage.ext myoption/ext.choice 1 media/iso_a4_210x297mm  
  
*SPJobTicket/Copy/Cost: 0.1500 myrule-2 \ ❸  
  org.savapage.ext myoption/ext.choice 2 media/iso_a3_297x420mm
```

- ❶ Definition of External IPP extension `myoption` with two custom choices. The default choice `none` is a reserved internal value, indicating that the option is not selected.
- ❷ Cost rule for `ext.choice-1` and A4 media.
- ❸ Cost rule for `ext.choice-2` and A3 media.



Security and privacy concerns (out-of-scope)

- **Saved copies on printer HDD**
 - Configure your MFP (AES encrypt HDD)
- **Secure MFP access**
 - Network access
 - Device access
- **~~Google Cloud Print?~~**



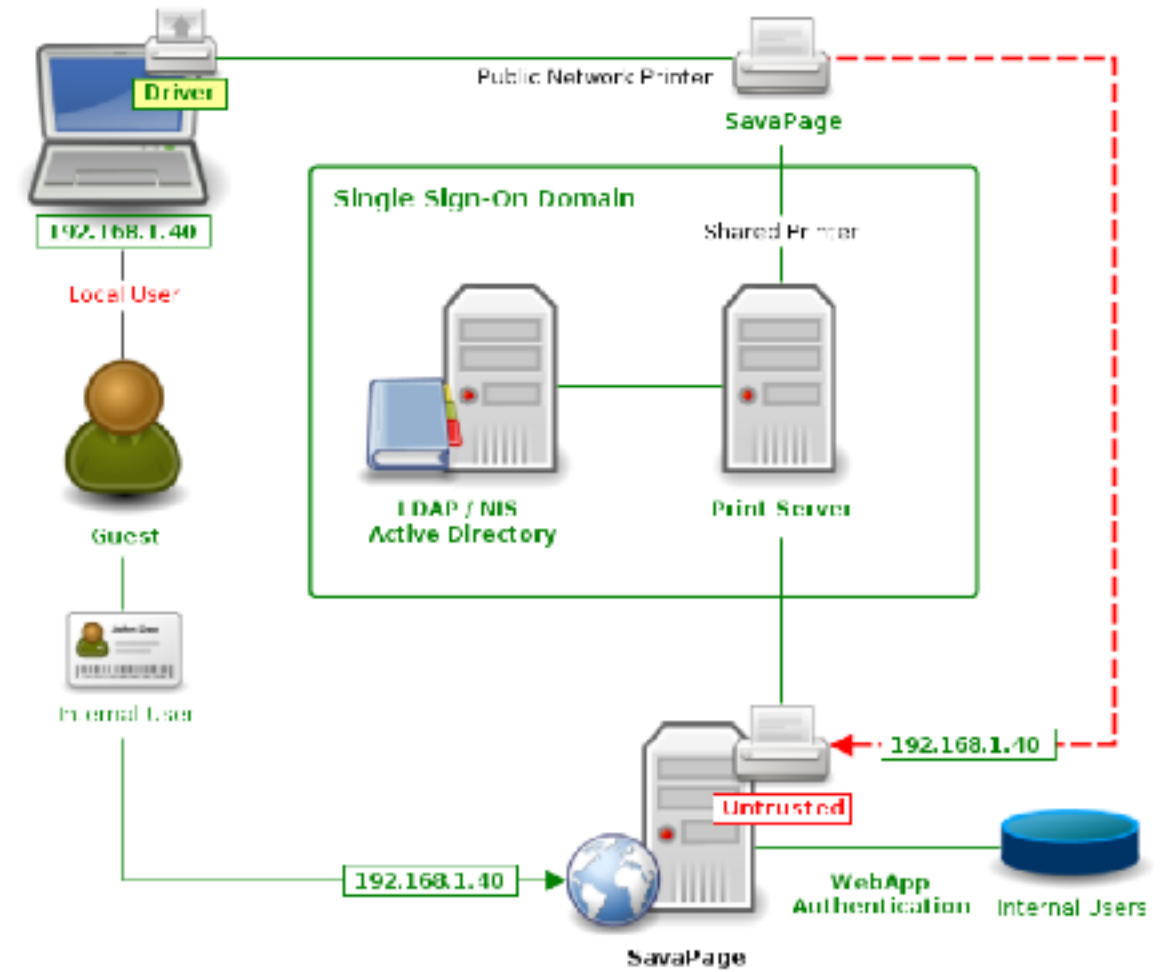
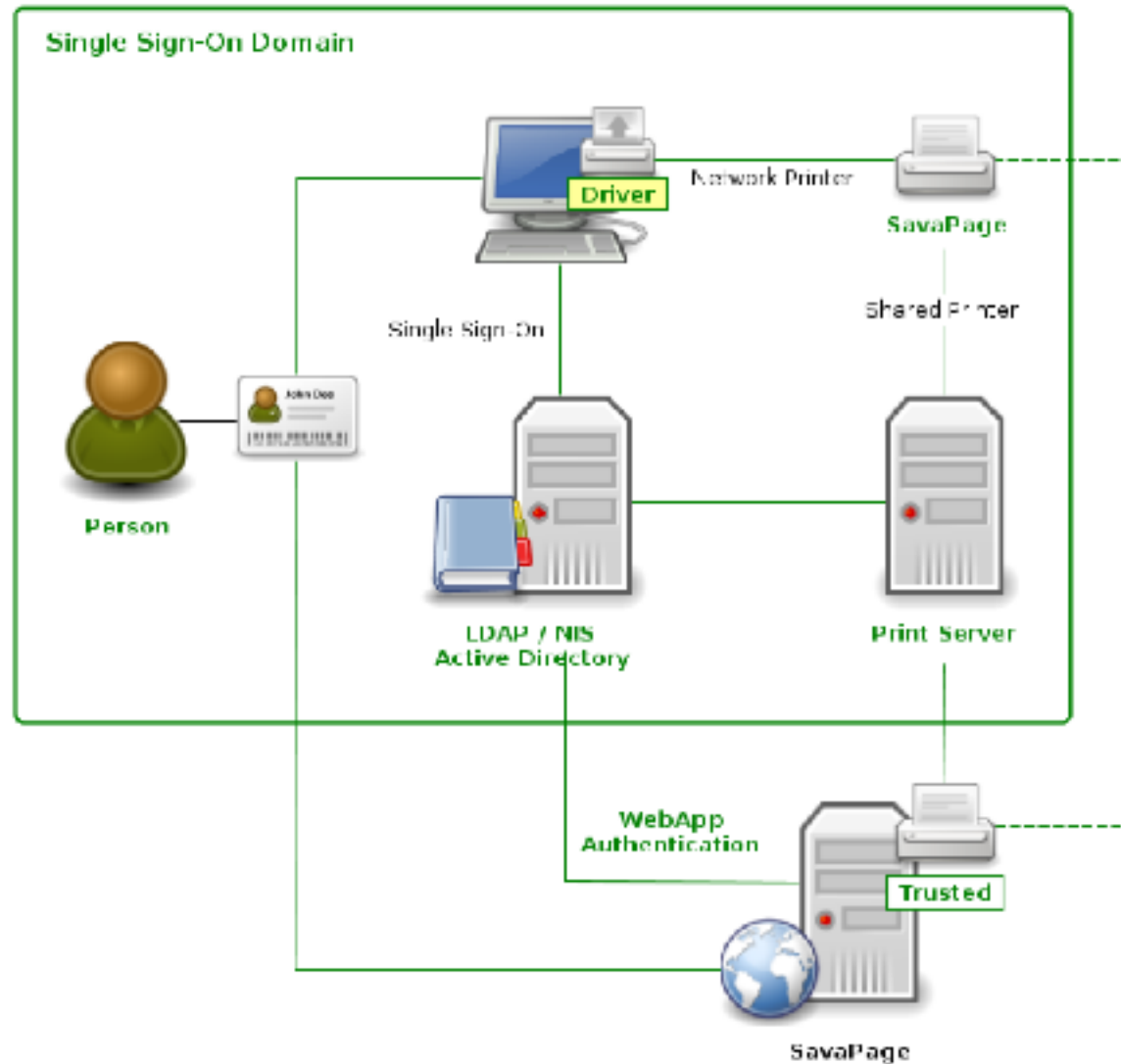


- Tracking and Tracing
 - Database
 - Document names
 - Anonymize jobs
 - PDF files
 - Personal queue, Archive
- Monitoring and Control
 - Transient data (control)
 - Trends, violations (monitoring)





It's all about trust





- Residents – Subscription
 - Technical Support
 - Requirements
- Partners – Fair share
 - Development Partners
 - Deployment Partners
 - Service Level Agreement
 - Translation Partners
- Community Manager
- Legal steward





Resident Subscription



Corporate | Government

Participants	Enrollment	Yearly
25	€350	€160
50	€425	€160
75	€500	€160
100	€550	€160
150	€675	€160
Above 150		
+10	€15	€3

Educational | Non-profit

Participants	Enrollment	Yearly
500	€425	€160
1000	€550	€160
1500	€675	€160
2000	€800	€160
2500	€925	€185
3000	€1050	€210
Above 3000		
+100	€25	€5

Special pricing Sponsorship

Extensions

Platform	Extension	Yearly
PaperCut	Delegated Print	€750
	User Sync and Auth Interface	€100
Smartschool	OAuth and Notifications	€150
	Afdrukcentrum ²⁾	€750
Google	Google Cloud Print ³⁾	€250
	Google Cloud Directory	€200
	OAuth	€150
Microsoft	Active Directory	€200
	Windows Driver Print ⁴⁾	€175
	SavaPage Client App ⁵⁾	€250
Oracle	External Database	€250
Mollie	Generic Payment Gateway ⁶⁾	on request
blockchain.info	Bitcoin Payment Gateway ⁷⁾	on hold



- Residents
 - BE (13), CH (1), RO (1), QA (1), NL (1)
 - Participants: 48000
- Partners
 - Integration Partners
 - BE (1)
 - Deployment Partners
 - NL (1)
 - Development Partners
 -
 - Translation Partners
 -



- **Development**

- Resident Requirements
 - IPP Routing + Plugin
 - Google Cloud Directory
- RESTful API

- **Vacancies**

- **Partners**
 - **Development**
 - **Deployment**





Thank you for your attention



<https://community.savapage.org>

Mission

Produce Open Printing Solutions with Free and Open Source Software.

Vision

A World where People & Planet enjoy a sustainable Open Printing Experience.