Share your data: Using a team display with Open Source software PalMA

Stefan Weil
Universitätsbibliothek Mannheim
Mannheim University Library
Time Schedule

10:00 Presentation of PalMA
10:20 Working with PalMA
11:00 Plenary discussion
11:30 PalMA internals
May 2014: New Learning Center for Mannheim University Library
Background 2

Our goal: Workplaces for groups with team monitor

The result: In-house development PalMA
Group work

Present and learn in Mannheim …

… or Study and Present in Teams in Bonn.

2015-06-08  ELAG 2015 Stockholm
PalMA

Info Stations

- PalMA architecture
- Facts and figures
- Source code and documentation
- Hardware needed for a PalMA workplace
- Supported file formats
- Virtual Network Computing
- Variable screen layout
- Why PalMA with wireless LAN instead of cables?
- Map of PalMA installations
- Design studies for PalMA user interface on smartphones
Team monitors with PalMA

- 1 x Intel NUC (= high end PalMA workplace)
- 2 x Raspberry Pi 2
- (1 x Raspberry Pi 1 Model B)

Try the PalMA team monitors with your notebook / tablet computer / smartphone.

Thank you to Kungliga biblioteket for providing the team monitors.
People

We are here for your questions:

Konstantin Baierer, project scientist
Stefan Weil, deputy head of library IT

(IT department of
Mannheim University Library)
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Abstract

Share your data: Using a team display with open source software PalMA

Stefan Weil, deputy head of the IT department, Universitätsbibliothek Mannheim

Mannheim University Library first introduced electronic workplaces for group work in the new Learning Center which opened in spring 2014. A key component of these workplaces is a large format team display with PalMA, a software solution which allows wireless access to the monitor from notebooks, tablet computers or smartphones. PalMA is free software and was developed by Mannheim University Library.

The bootcamp will introduce PalMA and focus on working with that software. Participants will also learn what is needed for their own PalMA installation.
Architecture

A full PalMA station consists of several components, which are based on each other:

PalMA station

<table>
<thead>
<tr>
<th>GNU / Linux</th>
<th>X11 Display Server</th>
<th>OpenBox Window Manager</th>
<th>Apache Server</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Web Browser</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Office Document Viewer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Presentation Software</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PDF Viewer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Image Viewer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Video Player</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VNC Client</td>
</tr>
</tbody>
</table>

User device

<table>
<thead>
<tr>
<th>Operating System (Windows, MacOS X, Linux, Android, iOS)</th>
<th>VNC Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browser</td>
<td>VNC Client</td>
</tr>
</tbody>
</table>

PalMA is based on the Debian GNU Linux operating system which is running an X11 server with a graphical user interface. The OpenBox window manager is used. Within this graphical environment various applications are started on demand to display web pages, office documents, images, PDF files or videos of the user. One of these applications is the VNC viewer which allows users to mirror the desktop of their mobile device on the PalMA team display.
The user communicates with the PalMA station exclusively through the web interface, which is implemented in **PHP** and **JavaScript**. The web interface is responsible for the authentication of users, manages **file uploads**, permits **variable display layouts** (for example two documents can be shown side by side) and orchestrates the process of desktop mirroring. Another practical feature is the automated logout of inactive users.

**Desktop mirroring** is implemented by the **VNC** (Virtual Network Computing) technology. VNC is a client-server model that can transfer user input (keyboard, mouse) from one or several VNC clients to a VNC server and transfer the graphical display from the VNC server to the VNC client in return. Similar technologies are Apple's AirPlay, Miracast oder Chromecast, but VNC offers several advantages:

- Platform independence: VNC is available for all major desktop operating systems as free software
- Free standard: VNC is not subject to patents or proprietary licenses
- Proven: VNC has been used for more than 15 years worldwide

To transfer the desktop of the user to the PalMA station, a VNC client is started on the PalMA station. This client waits for incoming connections. The user starts a VNC server and connects to the VNC client by giving the name of the PalMA station as the destination.
Facts and Figures

Start of PalMA development: February 2014
Opening of Learning Center with PalMA: May 2014

PalMA was developed by five employees of Mannheim University Library. It also contains contributions written by five students who sent us improvements and translations for Italian, Russian and Spanish. Our original web application already provided a user interface in German and English.

There are now PalMA team monitors in at least five libraries.

In a Nutshell, PalMA...

--- has had 154 commits made by 10 contributors representing 7,177 lines of code
--- is mostly written in JavaScript with a low number of source code comments
--- has a young, but established codebase maintained by a large development team with stable Y-O-Y commits
--- took an estimated 2 years of effort (COCOMO model) starting with its first commit in May, 2014 ending with its most recent commit 3 days ago

Languages

<table>
<thead>
<tr>
<th>Language</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>XML</td>
<td>32%</td>
</tr>
<tr>
<td>JavaScript</td>
<td>21%</td>
</tr>
<tr>
<td>PHP</td>
<td>26%</td>
</tr>
<tr>
<td>Other</td>
<td>21%</td>
</tr>
</tbody>
</table>

Lines of Code

Activity

30 Day Summary
April 23 2015 — May 23 2015
26 Commits
3 Contributors including 2 new contributors

12 Month Summary
May 23 2014 — May 23 2015
152 Commits
Up +150 (7500%) from previous 12 months
10 Contributors
Up +9 (900%) from previous 12 months

Source: [https://www.openhub.net/p/palma](https://www.openhub.net/p/palma)
Source Code and Documentation

Source code and documentation are available at our GitHub repository:

http://github.com/UB-Mannheim/PalMA

PalMA is licensed under the terms of the GNU General Public License (GPL), version 3 or later.

This means that you are free to:

- deploy and run PalMA without costs
- develop PalMA in any way you wish
- change the name and branding of the software to your liking

This open license comes with a few restrictions. If you are using PalMA, you must agree to:

- exclude the developers from any liability
- distribute PalMA or derivatives of it under the same terms
Hardware

Mini-PC:
for example Intel NUC5i5RYK (with Intel Core i5 processor, 4 USB 3.0 ports, Mini HDMI and Mini DisplayPort)
4 GB RAM and 30 GB SSD are sufficient.
Costs about 470 €

Alternative:
Raspberry Pi 2 Model B
with 16 GB SD card, power supply and case
Costs about 60 €

Monitor:
Recommended is a 1080p (Full HD) resolution with a display size of at least 32 inch to work comfortable even with a divided screen. Due to the pricing, a TV is preferable to a classic PC-Screen.

Example: Sony Bravia KDL-32W705
(4 HDMI ports, energy efficiency class A)
Costs about 370 €
Supported File Formats

The PalMA web interface offers users the option to upload files in a variety of formats and to view them directly on the monitor, without establishing a VNC connection and sharing the desktop.

PalMA currently supports these file formats:

- PDF Documents (pdf)
- Image files (gif, jpg, png)
- Microsoft Word / LibreOffice Writer (doc, docx, odt, txt)
- Microsoft Powerpoint / LibreOffice Impress (ppt, pptx, pps, ppsx, odp)
- Microsoft Excel / LibreOffice Calc (xls, xlsx, ods)
- HTML-Documents (html)
- Videos (mpg, mpeg, avi, mp4)
Virtual Network Computing (VNC)

VNC is a technology for sharing graphical user interfaces and user inputs between computers in a network (Desktop Sharing).

PalMA uses VNC as the protocol for Desktop Sharing because it offers some advantages over comparable technologies:

- **Platform independent**: VNC is available on all common operating systems without any costs
- **Open Standard**: VNC is not restricted by patents or proprietary licenses
- **Proven track record**: VNC has been in use for more than 15 years
- **Resource efficient**: A VNC server/client can be deployed even on inexpensive commodity hardware
# Window Tiling Layouts in PalMA

<table>
<thead>
<tr>
<th>Layout</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Single Window" /></td>
<td>Show only one window (default setting). Great for cooperatively working on a document or extending one's screen.</td>
</tr>
<tr>
<td><img src="image2.png" alt="Two Windows Horizontal" /></td>
<td>Arrange two windows horizontally.</td>
</tr>
<tr>
<td><img src="image3.png" alt="Two Windows Vertical" /></td>
<td>Arrange two window vertically. A good setting for comparing documents.</td>
</tr>
<tr>
<td><img src="image4.png" alt="Three Windows" /></td>
<td>Tiling three-window layout. Useful for working on a document but keeping reference applications (dictionary in a browser, a PDF with definitions…) in the other windows.</td>
</tr>
<tr>
<td><img src="image5.png" alt="Four-Way Split" /></td>
<td>Four-way split. This is the maximum number of concurrent windows that PalMA allows at the moment.</td>
</tr>
</tbody>
</table>
Why Palma?


Universitäts- und Landesbibliothek Bonn (SPrinT = Studieren und Präsentieren in Teams)
Badische Landesbibliothek Karlsruhe
Universitätsbibliothek Mannheim (45 workplaces / Arbeitsplätze)
Württembergische Landesbibliothek Stuttgart
Bibliothek der Pädagogischen Hochschule Freiburg
Design-Studien / Design Studies
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