



2.2.1

Linux Thin Client Project

vmfree.org

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1 System requirements for xrc

Raspberry Pi:

- Raspberry Pi 3 or Pi 4
- SDMemory card with at least 8 GB storage space
- file xrc.zip

Ubuntu or a manual installation:

- Ubuntu server April 20
- file xrcbin.tar.gz

Optional:

- For Raspberry Pi 3: Pi desktop case by element14:
<https://www.element14.com/community/docs/DOC-83477?ICID=searchandfilter-result-designcenter>
- For Raspberry Pi 4:
One Nine Design Power HAT board & Case:
<https://www.raspberrypioplastics.com/power-hat-board>
Argon one case:
<https://www.argon40.com/argon-one-raspberry-pi-4-case.html>

2 Thanks

Thanks *Joe Fellner* for the splash screen.

Thanks *Jochen Hohlbaum* and *David Walter* for tests and suggestions.

Thanks Matteo for the italian translation.

3 Release Notes

Release 1.0:

- Initial

Release 1.1:

- Supports Ubuntu 17.10 server
- New network interface

Release 1.2:

- Uses Raspbian Stretch Lite

Release 1.3:

- Remote administration with ssh
- Remote administration of the GUI mit VNC
- Bug fixes

Release 1.3.1:

- Bug fixes

Release 1.4:

- New version Raspbian Stretch Lite to support Raspberry Pi 3 Model B+
- Screen resolution and screen saver settings
- Alternative connections

Release 1.4.1:

- Own login for X2GO
- operating system Raspbian updated

Release 1.5:

- VPNconnection
- operating system Raspbian updated

Release 1.5.1:

- operating system Raspbian updated
- Version for Raspberry Pi 4

Release 1.6th:

- Supportt casing by One Nine Design with on / off switch for Raspberry Pi 4
- Supportt casing Argon 1 with on/off switch for Raspberry Pi 4

Release 1.7:

- Soundoutput via HDMI
- Automount USB Memory stick

Release 1.7.1:

- Uses Ubuntu 20.04 server
- Uses Raspberry Pi OS Mai 2020
- Raspberry Pi: Network configuration with dhcpcd.conf
- Tiger VNC replaced RealVNC

Release 1.8:

- Uses Raspberry Pi OS December 2020
- Dual monitor
- USB sound output
- Desktop icons
- Configuration without GUI
- Configuration date/time
- Timed actions

Release 1.9:

- Uses Raspberry Pi OS January 2021
- Save passwords encrypted
- Simple context menu
- No virtual consoles
- Password "root" and "thinclient" changeable
- Host name changeable
- Switch numeric keypad on/off

Release 1.9.1:

- Bug in thinclient-config
- Various bugs during shutdown configuration

Release 2.0:

- Bug fixing
- Print system CUPS
- WireGuard
- Overlay file system

Release 2.1:

- xfreerdp 3.0
- Parameters for RDP in GUI
- Forwarding webcam with RDP

Release 2.1.1:

- Raspberry OS May 2021
- Bug in WLAN password fixed
- Bug in OpenVPN connection fixed
- Display passwords

Release 2.1.2:

- Bug fixing
- New Version xfreerdp 3

Release 2.1.3:

- Bug fixing screensaver and standby
- Bug fixing initrd
- Italian language

Release 2.2:

- Raspberry OS Oct 2021
- One-time password with OpenVPN

Release 2.2.1:

- Raspberry Pi OS Lite (Legacy) April 2022
- Bug fixing VPN

4 Contact

If you have any questions, please contact: info@vmfree.org

5 Download

xrc can from www.vfmree.org downloaded.

6 Installation for Raspberry Pi 3 or Pi 4

The file `xtc.zip` contains an image file which the operating system Includes Raspberry Pi OS and xtc. After writing the image to a memory card, xtc is immediately available.

Installation:

1. Download the file `xtc.zip` down.
2. Unzip the file.
3. Copy the unzipped file `xtc.img` on the memory card.

With Linux, you can do this in the console:

```
sudo dd if=xtc/xtc.img of=<SD-memory card>
```

You can use the to determine under which name the memory card can be accessed
command `sudo fdisk -l`.

With Windows:

There are several tools for writing to an SD card. You can e.g.
`Win32Diskimager.exe` use.

4. Insert memory card in Raspberry Pi and turn on the Raspberry Pi.

7 Installation for Ubuntu

Unlike xtc for the Raspberry pi, xtc for Ubuntu contains only the application. To be able to install xtc, you have previously Ubuntu Server version 20.04 to be installed.

Note: you will need an internet connection, there during the installation Packages for xtc can be downloaded from the Internet

Installation:

1. Extract file: `tar xvfzp xtbins.tar.gz`
2. Start installation: `sudo sh xtc/install.sh`
3. After the installation restart the PC.

8 Service

The configuration of xtc is done via the "Thinclient" dialog, which is displayed after starting xtc.

From version 2.0 there are changes in the use of the administrator mode. This is now only available after a restart of xtc. The reason is that "overlayfs" is now used as read-only file system. This must be switched off before making any changes. This is only possible after a restart of the system. However, overlayfs is only used in the version for the Raspberry Pi. There is no read-only file system on Ubuntu.

Use admin mode only to configure xtc. Only in user mode, the system is read-only and thus protected from changes.

8.1 Administration mode

After installation, or if the **Start administrator mode** button has been selected in the **System** tab, xhc will run in administrator mode. Then all registers are available. To run the administrator mode, the administrator password must be entered (see the **Settings** tab).

8.2 User mode

If xhc is run in user mode (after clicking the **Start User Mode** button in the System tab) only the **Connect** and **System** tabs are available.

After selecting a mode, xhc restarts.

8.3 Changes configuration

After changes the configuration (network, hardware, etc.), the changes must be saved and xhc restarted. This is done with the button **Save and restart in** "Save" tab.

8.4 Message: Cannot read network settings

When starting xhc appears the message "Cannot read network settings".

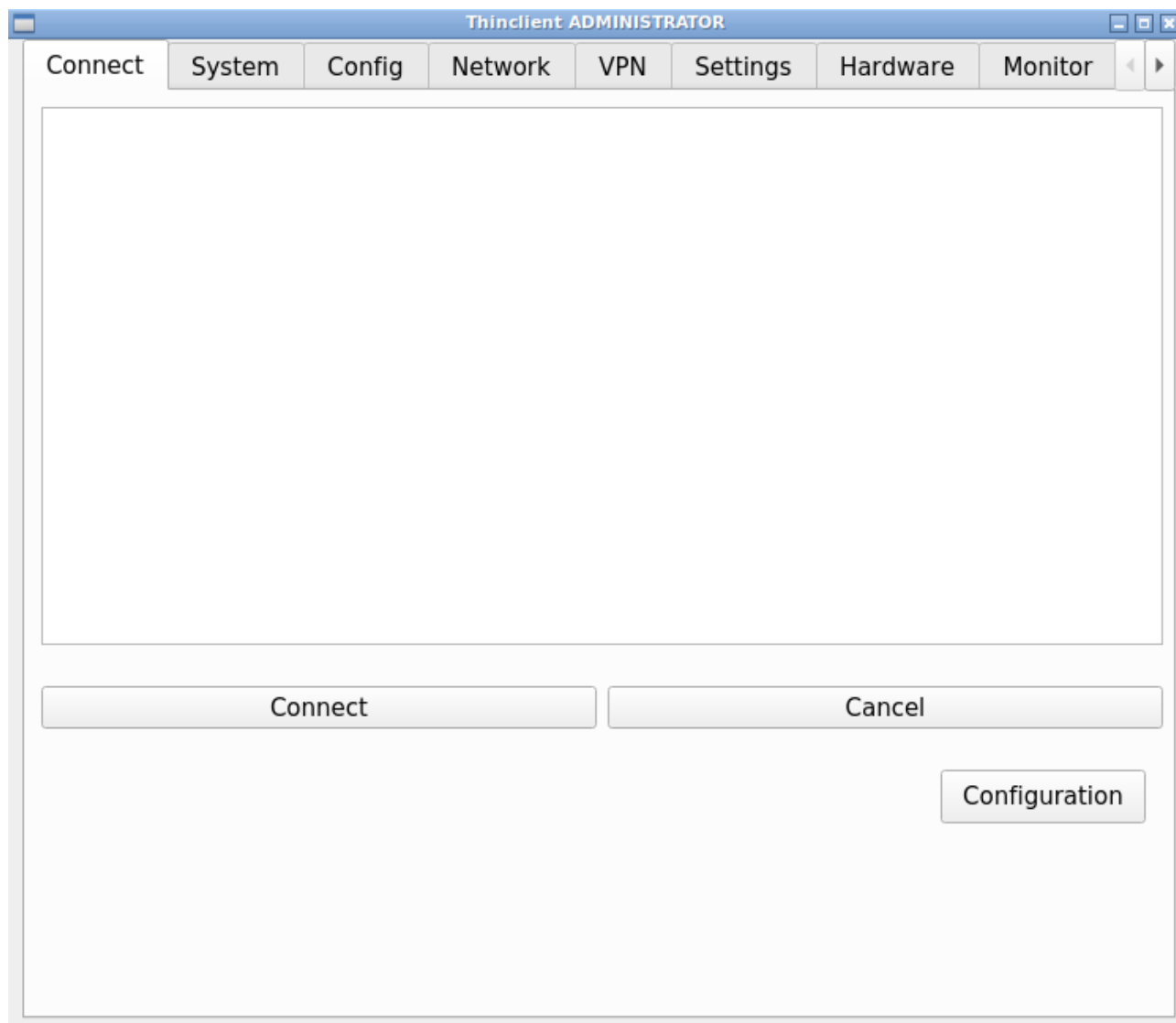


xhc cannot read the system's network settings. This can be the case if you use special network settings (e.g. network bundling).

You should then not save any network settings, otherwise the settings of your system will be overwritten.

9 Configuration

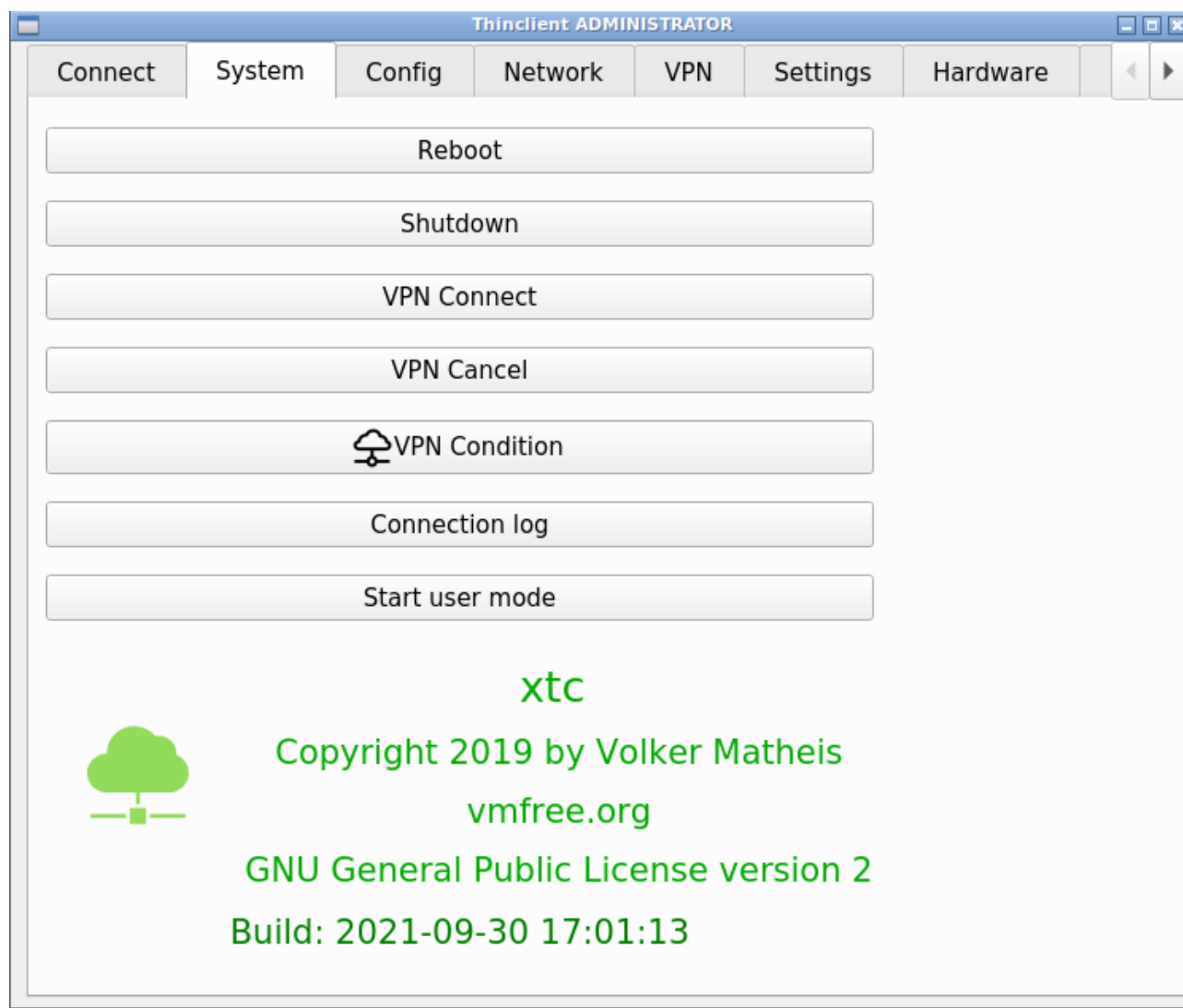
9.1 Connect tab



Configured connections are displayed. By double-clicking on a connection or by highlighting a connection and clicking the button `Connect`, a connection is established. If a connection is active, this is displayed as a green cloud to the left of the connection name. If you click the `Disconnect` button, an existing connection is terminated.

- **Configuration:** If the application is run in user mode (the `Configure` and `System` tabs are available), you can switch to administrator mode by clicking on this button and entering a password. Then all registers are available.

9.2 System tab

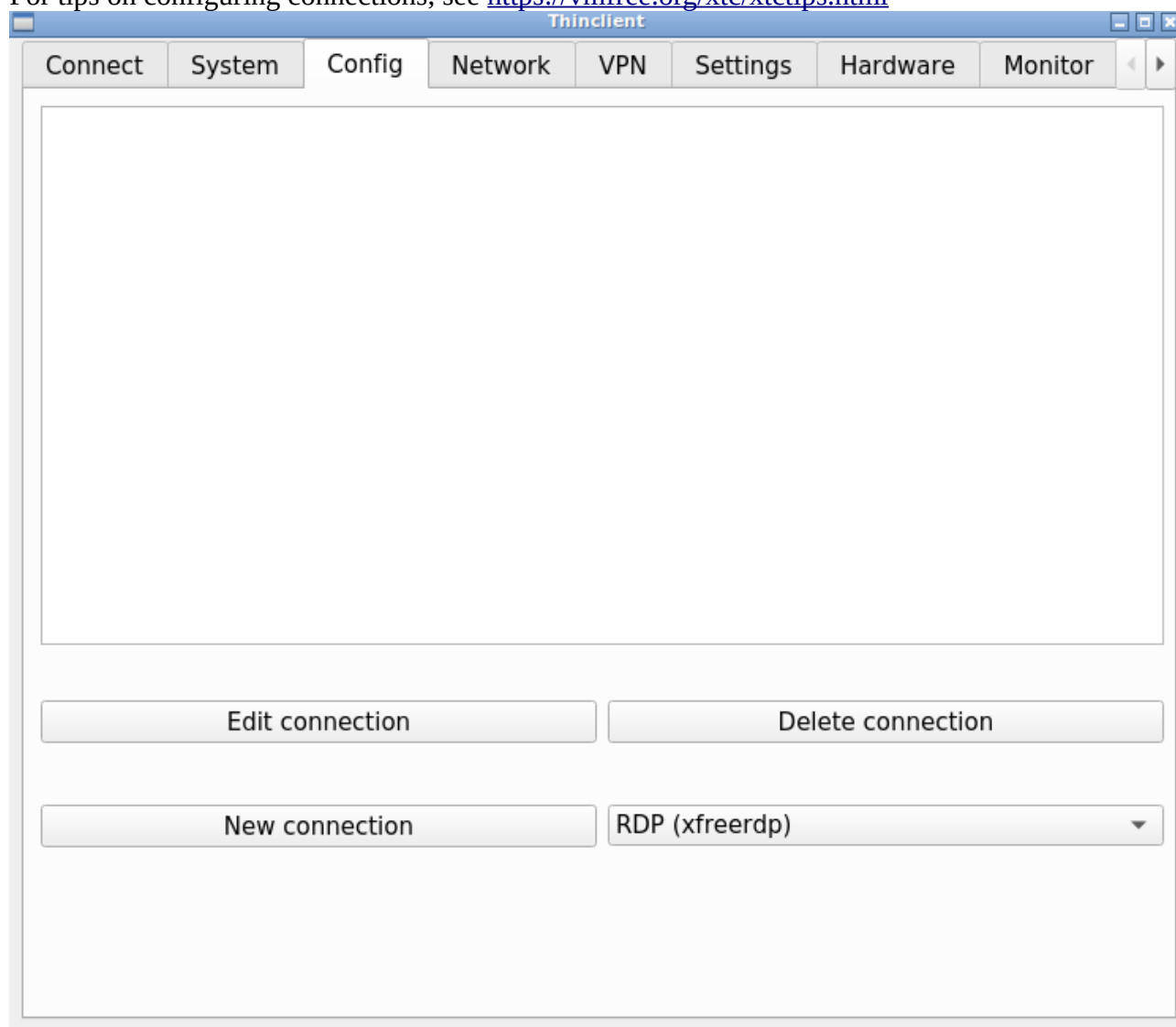


- **Reboot:** Clicking this button will restart the system.
- **Shutdown:** Clicking this button will shut down the system.
- **VPN Connect:** Click on this button to start a VPN connection. To configure the VPN connection, see section "VPN".
- **VPN Cancel:** Clicking this button will terminate an existing VPN connection. To configure the VPN connection, see section "VPN".
- **VPN Condition:** Clicking this button displays the status of a VPN connection. To configure the VPN connection, see section "VPN".
- **Connection log:** If a connection cannot be established, information is displayed by clicking this button.
- **Start user mode:** If xtc is running in administrator mode (ADMINISTRATOR is displayed in the title bar and all tabs are available) clicking this button will switch to user mode.

- **Start administrator mode:** If xhc is running in user mode (only the Connect and System tabs are available), clicking this button will switch to administrator mode. For this purpose, the administrator password must be entered.

9.3 Configure tab

For tips on configuring connections, see <https://vmfree.org/xtd/xtctips.html>



Be here the Connections established.

- **New connection:** In the selection field to the right of this button, the type of connection is first selected. Clicking this button opens a dialog with the parameters to be entered for the selected connection type.
- **Edit connection:** To change parameters of a connection, this must be marked in the selection list. Clicking this button opens the dialog with the parameters for the selected connection.
- **Delete connection:** To delete a connection, you must first mark these in the selection list. Clicking on this button removes the selected connection.

Depending on Type of There is a connection various Input fields. Example of an RDP connection:

The screenshot shows the 'RDP (xfreerdp)' configuration window. It includes the following elements:

- Name:** Text input field.
- Address:** Text input field.
- Own login:** Text input field.
- Password:** Text input field.
- Domain:** Text input field.
- Resolution:** Dropdown menu showing '640x480'.
- Color:** Dropdown menu showing '8'.
- Printer:** Dropdown menu.
- USB device:** Dropdown menu.
- GDI:** Dropdown menu showing 'hw'.
- GFX:** Checkbox (unchecked).
- RFX:** Checkbox (unchecked).
- Glyph Cache:** Checkbox (checked).
- Clipboard:** Checkbox (unchecked).
- Ignore certificate:** Checkbox (checked).
- Further parameter:** Text input field.
- Check host connection:** Checkbox (checked).
- System login:** Checkbox (unchecked).
- Connect new:** Checkbox (unchecked).
- Autostart:** Checkbox (unchecked).
- Alternative:** Dropdown menu.
- Create icon:** Checkbox (unchecked).
- Icon name:** Text input field.
- Version 2:** Radio button (selected).
- Version 3:** Radio button (unchecked).
- Buttons:** 'OK' and 'Cancel' buttons at the bottom.

- **Name:** Name of the connection. This name is used in the Connection overview displayed.
- **Address:** IP address or name of the server with which the connection is to be established.
- **Login name/User:** User name with which you want to connect to the server.
- **Password:** Password with which you want to connect to the server. The password is stored in encrypted form.
- **Domain (only RDP):** Domain name from the server.
- **Resolution:** Selection of Screen resolution, which is used for the client.
- **Color:** Selection of Color depth, which is used for the client.
- **Printer (RDP only):** If you have configured a printer in xrc (see section "Printer"), it can be selected here. This printer will then be passed on to the server.
- **USB devices (RDP only):** Selection of a connected USB device. This device will be forwarded to the server.
- **GDI (RDP only):** To improve the graphics output, select either "Hardware (hd) or Software (sw) here.
- **Glyph Cache (RDP only):** To improve the graphics output.
- **GFX (RDP only):** Enables GFX from Windows. To improve the graphics output.
- **RFX (RDP only):** Enables RemoteFX from Windows. To improve the graphics output.

- **Ignore Certificate (RDP only):** Do not perform certificate verification.
- **Clipboard (RDP only):** Forward the clipboard to the server.
- **Further parameter:** Here you can additional Parameters are entered. These parameters are passed to the client program. To do this, read the documentation for the client programs.
- **System login (RDP only):** To display a dialog for querying the user name and password. The input is passed on to the server for login.
- **Autostart:** After starting xrc, the connection is established automatically.
- **Connect new:** After the connection is terminated, it is restarted.
- **Check host connection (RDP only):** Here you can choose whether to check whether a connection to the server is possible. For this purpose the program "ping" used. It is possible that the server does not support "ping". Then turn this test off.
- **Alternative:** Select an alternative connection here that should be established when the connection with dem server in these settings cannot be established.
- **Create icon:** This creates an icon on the desktop. A connection can be started with this symbol by double-clicking. This is an alternative to the connection list.
- **Icon name:** Enter the name for the desktop icon here.
- **Port (only ssh and XDMCP):** Port on the server.
- **Application (SSH only):** Desired application to be run on the server.
- **Keyboard layout (X2GO only):** Keyboard layout, which the client should use.
- **Desktop (only X2GO):** Desktop that is on the server is used.

To save the configuration, click the "OK" button.

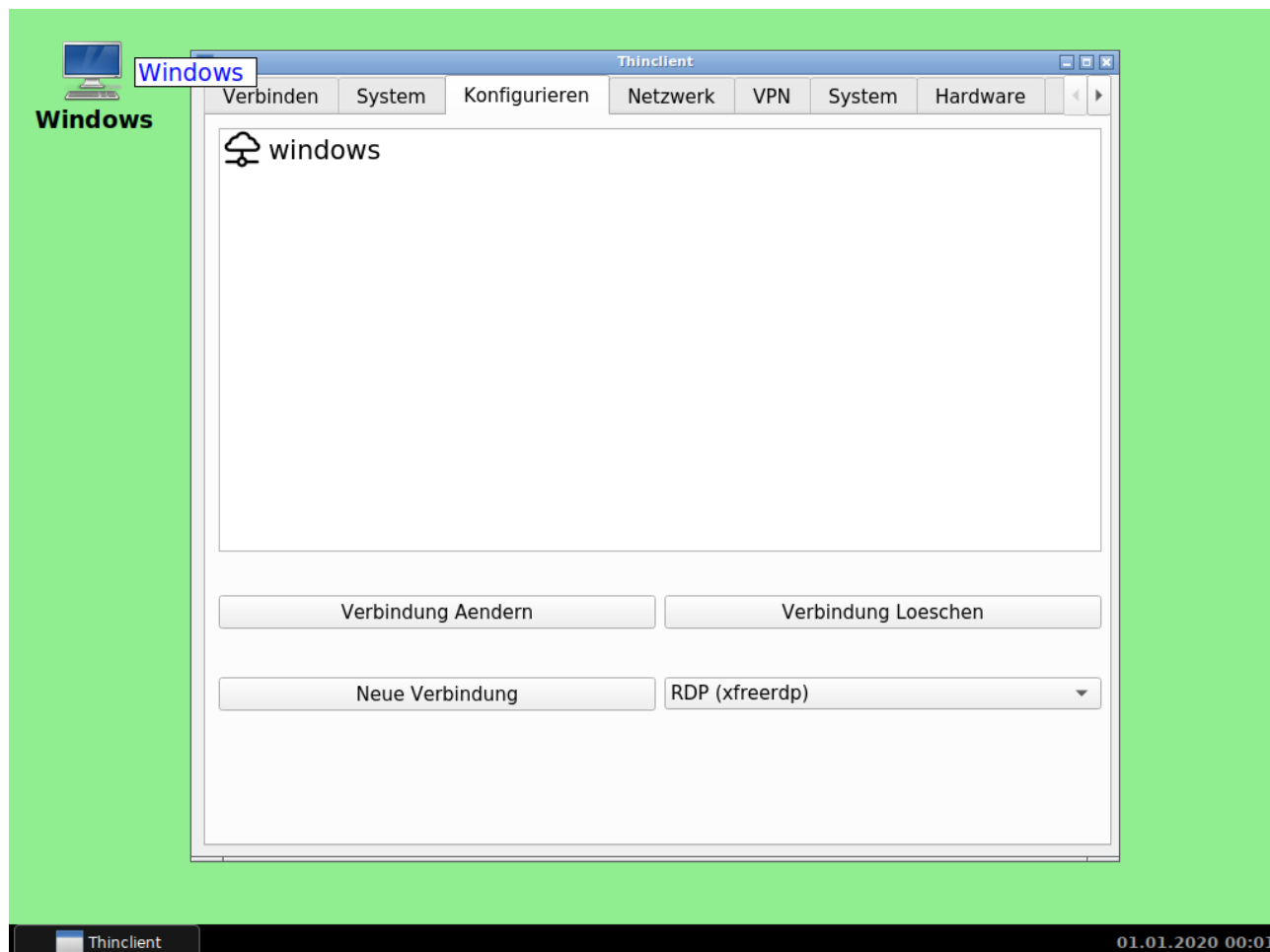
9.3.1 Establishing connections

For tips on configuring connections, see <https://vmfree.org/xrc/xrctips.html>

9.3.2 Start icons

With the button **Create icon** a start icon can be created. By double clicking with the left mouse button the connection starts. The icon can be moved by clicking with the right mouse button. To remove the icon again, remove the check mark from the **Create icon** button in the corresponding connection.

Screen with icon:



9.3.3 Connection software

These applications are used for the connections:

Connectdungsart	Useds Clientprogram
RDP	xfreerpd, rdesktop
VNC	tigervncviewer
X2GO	pyhoca-cli
SSH	ssh
XDMCP	xephyr


9.4 Network tab

The screenshot shows the 'Network' tab in the 'Thindient ADMINISTRATOR' application. The window has a title bar with standard OS controls. Below the title bar is a tabbed interface with tabs for 'Connect', 'System', 'Config', 'Network' (selected), 'VPN', 'Settings', and 'Hardware'. The 'Network' tab contains the following configuration options:

- Do not save network settings:** A checkbox that is currently unchecked.
- Network interface:** A dropdown menu showing 'enp0s3'.
- Connection type:** Two radio buttons: 'DHCP' (selected) and 'static IP'.
- Address:** A text input field containing '192.168.0.40'.
- Subnetmask:** A text input field containing '255.255.255.0'.
- Gateway:** A text input field containing '192.168.0.10'.
- DNS:** A text input field containing '1.1.1.1'.
- WLAN name:** A dropdown menu with a 'Search' button to its right.
- WLAN password:** A text input field with an eye icon to its right for toggling visibility.

The network connection for the system is configured here.

- **Do not save network settings:** If you have network settings that should not be changed, put a tick here. The tick is set automatically if network settings cannot be read by xtc.
- **Network interface:** Here, select the network connection with which a connection is to be established. The network connection depends on the network types installed.
- **DHCP, static IP:** Select how the network connection should be set up.
- **Address:** Enter the IP address that the system should receive here.
- **Subnetmask:** Enter the network mask here.
- **Gateway:** If required, enter a gateway here.
- **DNS:** If necessary, enter one or more name servers here.
- **WLAN name:** Enter the name (SSID) of a wireless network here if you want to set up a network connection with WLAN. Or select an SSID from the list.
- **Search:** Searches for WiFi in your area again.
- **WLAN password:** Enter the password of the wireless network here if you want to set up a network connection with WLAN.

- Click  to view the password.

9.5 VPN tab

The screenshot shows the 'VPN' tab in the 'ThinClient ADMINISTRATOR' application. The interface includes a tab bar at the top with 'Connect', 'System', 'Config', 'Network', 'VPN' (selected), 'Settings', and 'Hardware'. Below the tabs, there are two radio buttons: 'Open VPN' (selected) and 'Wireguard'. Under 'Open VPN', there are several input fields and buttons: 'Parameterdatei' with a text box and a browse button (...), 'Further parameter' with a text box, 'Additional Files' and 'Delete File' buttons, 'Run with' with a text box and a browse button (...), 'System login' and 'Autostart' checkboxes, and 'One-time password' checkbox. The 'Wireguard' section is currently empty.

A VPN connection can be set up via the "VPN" tab. Open VPN and WireGuard are supported as VPN clients.

- **Parameter file:** Save the configuration file for OpenVPN or Wireguard here. The configuration file is saved in the `/data/vpn` folder. The file is saved with the name `vpn.ovpn` for OpenVPN and `wg0.conf` for Wireguard.
- **Other parameters:** If you want to pass parameters to OpenVPN or Wireguard, enter them here.
- **Additional files:** save any additional files that OpenVPN or Wireguard needs from here (for example, certificate files).
- **Run with:** If you have your own script to start OpenVPN or Wireguard, you can save it here. This is necessary, for example, if transfer parameters to the VPN server must be in a certain format. The script is saved in the folder `/data/vpn` and gets the file name `vpn.sh`.
- **Own login:** If you select this checkbox, the login data will be requested when the VPN connection is established.

- **Start automatically:** Select this checkbox, the VPN connection will be established automatically when xtc is started.
- **One-time password:** If you select this checkbox, a one-time password will be requested in addition to the user name and password when establishing the VPN connection.

9.5.1 Copy files

Files can be copied to xtc using a USB stick. To do this, activate the `Connect USB automount` switch in the Hardware tab. You can also copy data to xtc with `scp`. To do this, activate the `Allow access ssh` function in the Settings tab.

9.5.2 Own VPN script

In the folder `/opt/thinclient/config` there is the template `vpn.sh` to create your own VPN script.

Important: The results of the VPN connection must be written to a file. The file name for the log file is contained in `$output`.

9.6 Prerequisites

A parameter file for `openvpn` or `wireGuard` is required for a VPN connection.

9.7 Installation with USB stick

Insert the USB stick with the required files into a free USB port.

9.7.1 Copying the parameter file

1. First select the VPN client: `OpenVPN` or `WireGuard`.
2. click the button ...
3. select the `/data/usb` folder in the file manager.
4. Select the parameter file for `OpenVPN` or `WireGuard`.
5. Click the `Open` button.
6. the file is now copied to the `/data/vpn` folder. If you have selected `OpenVPN` as the VPN client, the file is then named `vpn.ovpn`. If you have selected `WireGuard` as the VPN client, the file has the name `wg0.conf`.

9.7.2 Copy other files

1. Click the button `Additional files`.
2. Select in the file manager the folder `/data/usb`.
3. Select the desired file in the file manager.
4. Click the button `Open`.
5. The selected file is now copied to the folder `/data/vpn` copied.
6. Repeat the process for all of them required Files.

Note for Ubuntu: Your system may have a different drive label for the USB drive. Is given `/dev/sda1`. If that doesn't work, change the scripts `/opt/thinclient/script/mountusb.sh`

`/opt/thinclient/script/umountusb.sh`
the desired drive from.

9.7.3 Installation with scp

You can also copy the required files to xtc with scp. To do this, ssh access must be activated. See section "Settings tab".

Copying files to xtc with scp on Linux

Open a shell on your Linux PC and enter this command:

```
scp <file to be copied> thinclientssh@ <IP address xtc>:/data/vpn
```

Example:

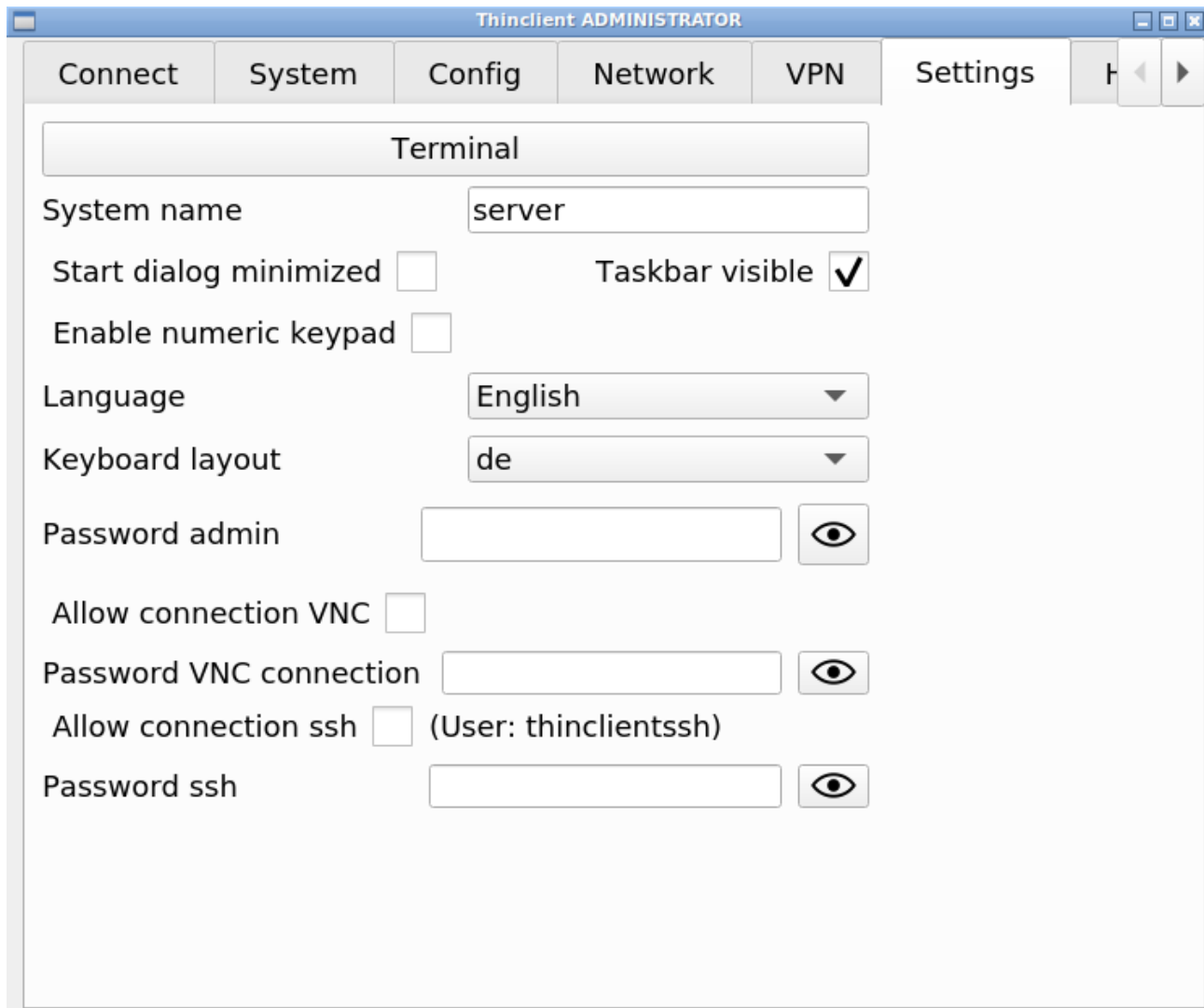
```
scp test.ovpn thinclientssh@ 192.168.0.42:/data/vpn
```

You need the password of the user thinclientssh enterthat you have previously assigned in xtc.
The files must be in the folder / data / vpn copied.

- **Further parameters:** Here you can enter further parameters which should be executed when starting openvpn. Please refer to the openvpn documentation for the syntax of the parameters.
- **Delete files:** With this button files from the folder /data/vpn to be deleted.
- **System login:** Select "Own login" if the user name and password should be entered when starting the OpenVPN connection.
- **Start automatically:** Select "Start automatically" if the VPN connection should be started automatically when xtc starts.

To create or end a VPN connection, use the corresponding buttons. See "System tab".

9.8 Settings tab



Thinclient ADMINISTRATOR

Connect System Config Network VPN Settings

Terminal


System name

Start dialog minimized ☐ Taskbar visible ☒


Enable numeric keypad ☐

Language


Keyboard layout


Password admin 

Allow connection VNC ☐

Password VNC connection 



Allow connection ssh ☐ (User: thinclientssh)

Password ssh 

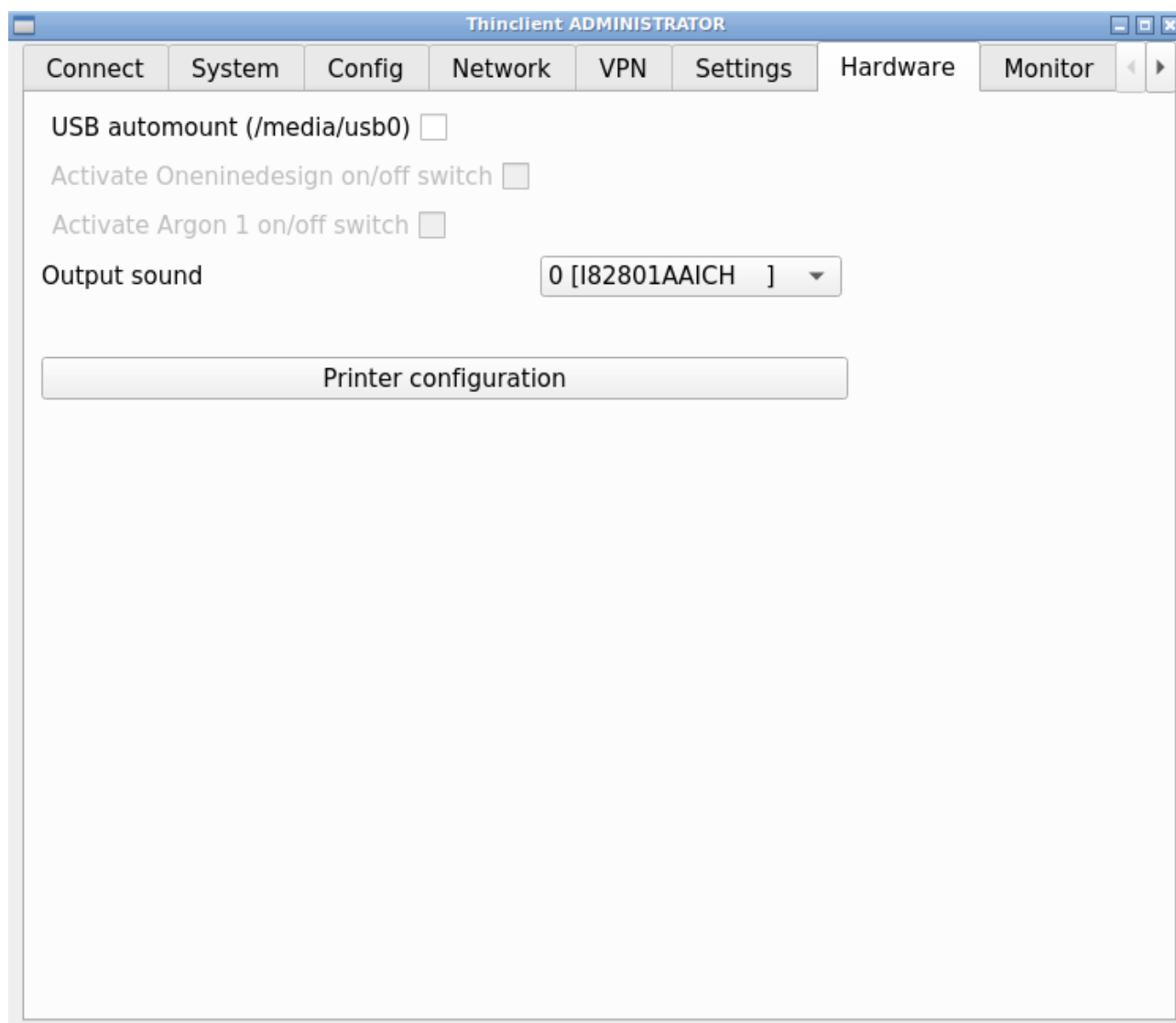
- **Terminal:** Click this button to start a console.
- **System name:** Enter a system name (hostname) for the system.
- **Start dialog minimized:** When starting xtc, the dialog is minimized in the panel.
- **Taskbar visible:** The taskbar can be hidden by removing the checkmark.
- **Language:** Select the here Displaypronounced.
- **Enable numeric keypad:** If a check mark is set, the numeric keypad will be switched on when xtc is started.
- **Keyboard layout:** Choose here die Assignment of the keyboard.
- **Password admin:** Enter a password here for the administrator mode. If the application starts in user mode, you can after input this Password to access all tabs. To enter the password, click on the tab "Connect" button **Extended**.
- Click  to view the password.
- **Allow connection VNC:** If this function is switched on, the graphical user interface of xtc can be managed from another PC. To do this, a VNC client (e.g. RealVNC) must be

installed on this PC. For Linux a call from the console could look like this:

```
vncviewer <IP address xtc>:0
```

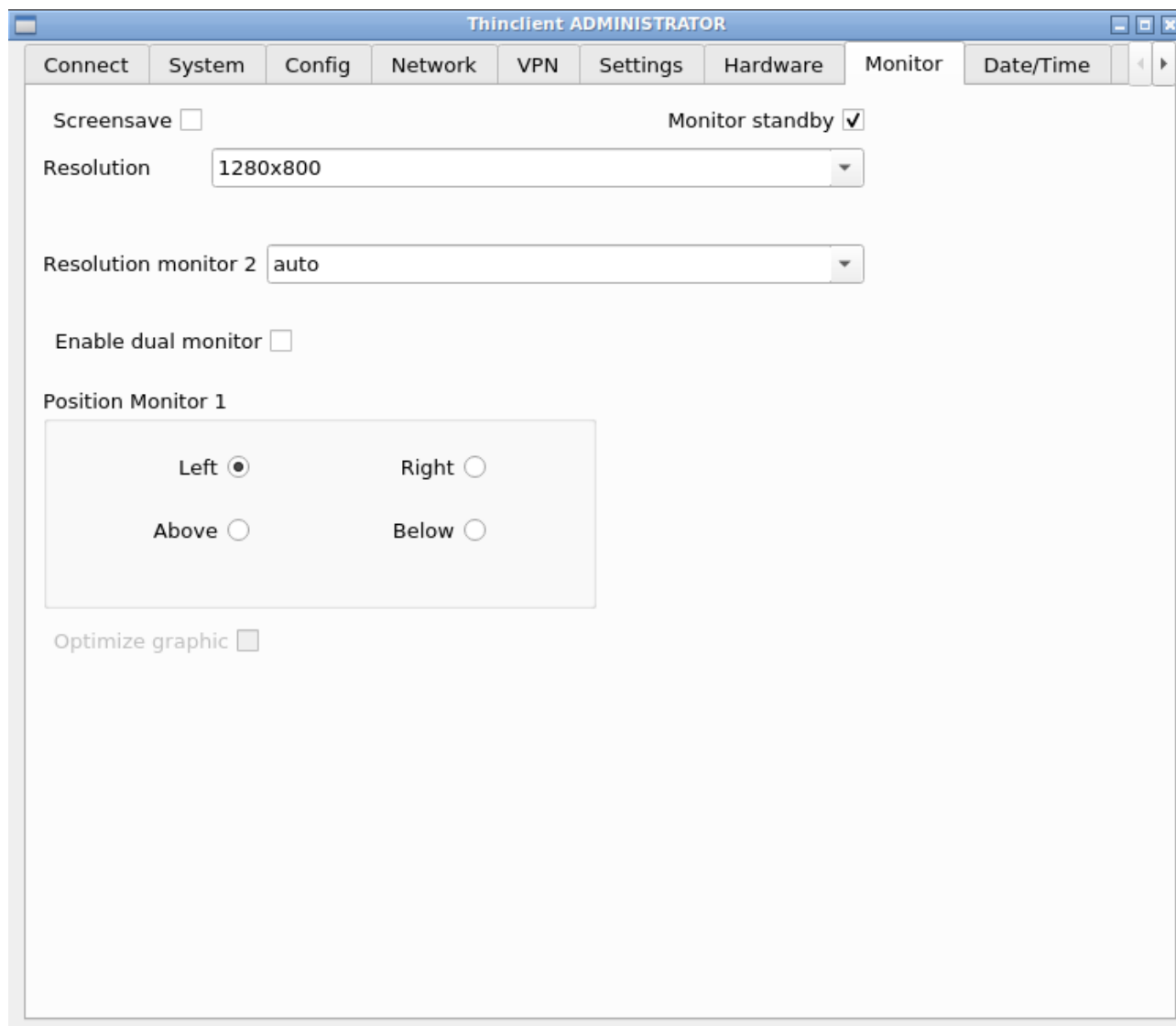
- **Password VNC connection:** If the access with VNC is allowed, so a password can be assigned. The password is required for the VNC client to establish the connection.
- Click  to view the password.
- **Allow connection ssh:** If you activate this function, the system started an ssh server. This means that with an ssh clients can access xtc. The user name for ssh is "thinclienssh".
- Password ssh, Repeat Password: If the access with ssh is allowed, so a password can be assigned. The password is required for the ssh client to establish the connection.
- **Password ssh:** Enter a password.
- Click  to view the password.

9.9 Hardware tab



- **USB automount:** Check this box if a USBMemorytick should be connected automatically. D.he USB stick we then with the folder / media / usb0 vbound. The USB memory stick mustss with the VFAT file system (Windows file system) be formatted.
- **Activate Oneninedesign on/off switch:** Use one **Raspberry Pi 4** with the case from **oneninedesign** with built-in on/off switch, check this box so that you can use the on/off switch.
- **Activate Argon 1 on/off switch:** Use one **Raspberry Pi 4** with dem case **argon One** with built-in on/off switch, check this box so that you can use the on/off switch.
- **Output sound:** You use this selection to specify the device on which the sound should be output. The default output is via HDMI.
- **Printer configuration:** Click this button to configure a printer (see chapter "Printer").

9.10 Monitor tab



ThinClient ADMINISTRATOR

Connect System Config Network VPN Settings Hardware Monitor Date/Time

Screensave ☐ Monitor standby ☒

Resolution 1280x800

Resolution monitor 2 auto

Enable dual monitor ☐

Position Monitor 1

Left ☒ Right ☐
Above ☐ Below ☐

Optimize graphic ☐

- **Screensave:** If the checkmark is set, the screen saver is switched on after 10 minutes without any action.
- **Monitor standby:** If the checkmark is set, the screen is switched off after 10 minutes without any action.
- **Resolution:** Choose The screen resolution here out. If "auto" is selected, the standard resolution of the monitor is used.
- **Resolution Monitor 2:** If a second monitor is connected, you can select the screen resolution of this monitor here. If "auto" is selected, the standard resolution of the monitor is used.
- **Enable dual Monitor:** Activate this checkbox if you want to connect a second monitor. This is not possible for all systems. Therefore, check beforehand whether your system works with a second monitor.

- **Position monitor 1:** Specify where the logical position of the 1st monitor should be. This only makes sense if a second monitor is connected.
- **Optimize graphics:** Only for Raspberry Pi 3. If there are problems with the graphics output with RDP, activate checkbox. This will not load the driver "vc4-fkms-v3d". The driver is required for dual monitor operation.

9.11 Date/Time tab

The screenshot shows the 'Date/Time' tab of a 'Thinclient' configuration window. The window has a blue title bar and several tabs: Network, VPN, Settings, Hardware, Monitor, Date/Time (selected), Security, and Save. The main content area contains the following options:

- Do not change date and time** ☐
- Show date and time** ☒
- Set date and time automatically** ☐
- Date and time**
- Time server**
- Time zone**

Below these options is an **Action** section with a light gray background:

- Execute action** ☐ **Repeat action** ☐
- Action**
- Execute at**
- Last action**

- **Do not change the date and time:** The date and time from the system are not changed if the checkmark is set.
- **Show date and time:** The date and time will be displayed in the system tray if the checkmark is set.
- **Date and time automatically:** If the checkmark is set, the time is set automatically. A time server and a time zone must then be selected for this.
- **Date and time:** A date and time can be entered here. When xtc is started, this is the date and time used as the start time. The date and time must be entered in the format year-month-day hour: minute (example: 2020-12-30 13:40)
- **Time Server:** Enter the name of an NTP server here. Only useful if the date and time is switched on automatically.
- **Time zone:** Select a time zone here. Only useful if the date and time is switched on automatically.

- **Execute action:** xtc can perform an action at a specific time. This is done when the check mark is set.
- **Repeat action:** If the check mark is set, the action is repeated.
- **Action:** Select what action to take.
- **Execute at:** Enter a date and time when the action should be carried out. The date and time must be entered in the format year-month-day hour: minute Example: 2020-12-30 13:40. A time can also be entered in the form hour: minute. The entry is successful then begins with the "+" sign. Example: +03: 15. Means the action will be taken in 3 hours and 15 minutes.
- **Last action:** The date and time of the last action performed is displayed here.

9.12 Security tab

Thinclient ADMINISTRATOR

VPN Settings Hardware Monitor Date/Time Security Save

Simple context menu ☐

No virtual consoles ☐

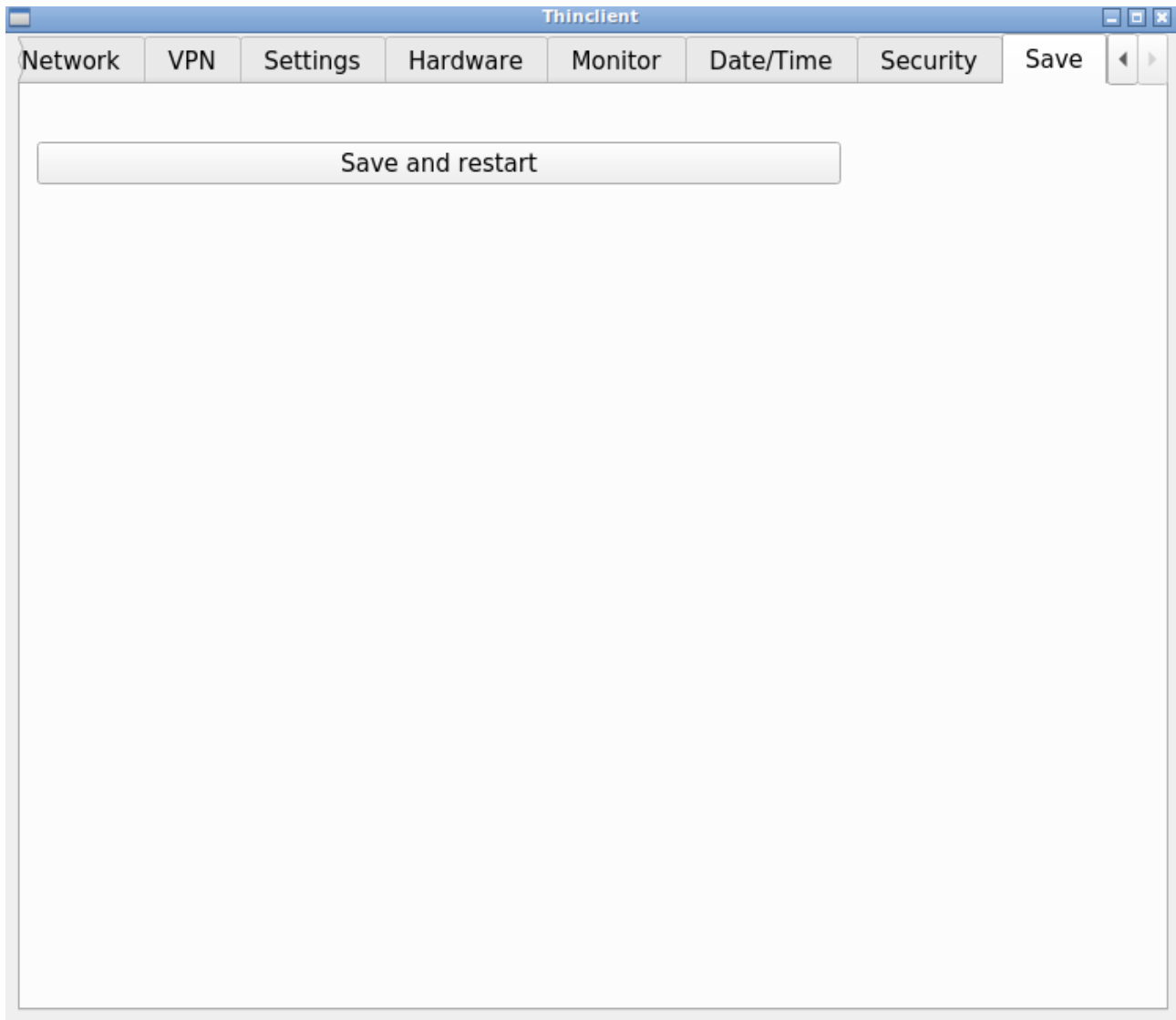
Password root

Password user thinclient

These settings can be used to improve the security of xhc.

- **Simple context menu:** If this box is checked, all commands are no longer available in the context menu (see also chapter "Context menu").
- **No virtual consoles:** If this field is checked, it is no longer possible to switch to a console with the key combination <Alt> + <F-key>.
- **Password root:** You can enter a new password for the "root" user here.
- **Repeat password:** The input from the password must be repeated here.
- **Password user thinclient:** You can enter a new password for the user "thinclient" here. xhc will be executed as user "thinclient".
- Click to view the password.

9.13 Save tab



The “Save” tab has only one button area:

Save and restart

After changes in the configuration must **Save and restart** are executed.

Note: Saving and restarting do not have to be carried out when a new connection is created.

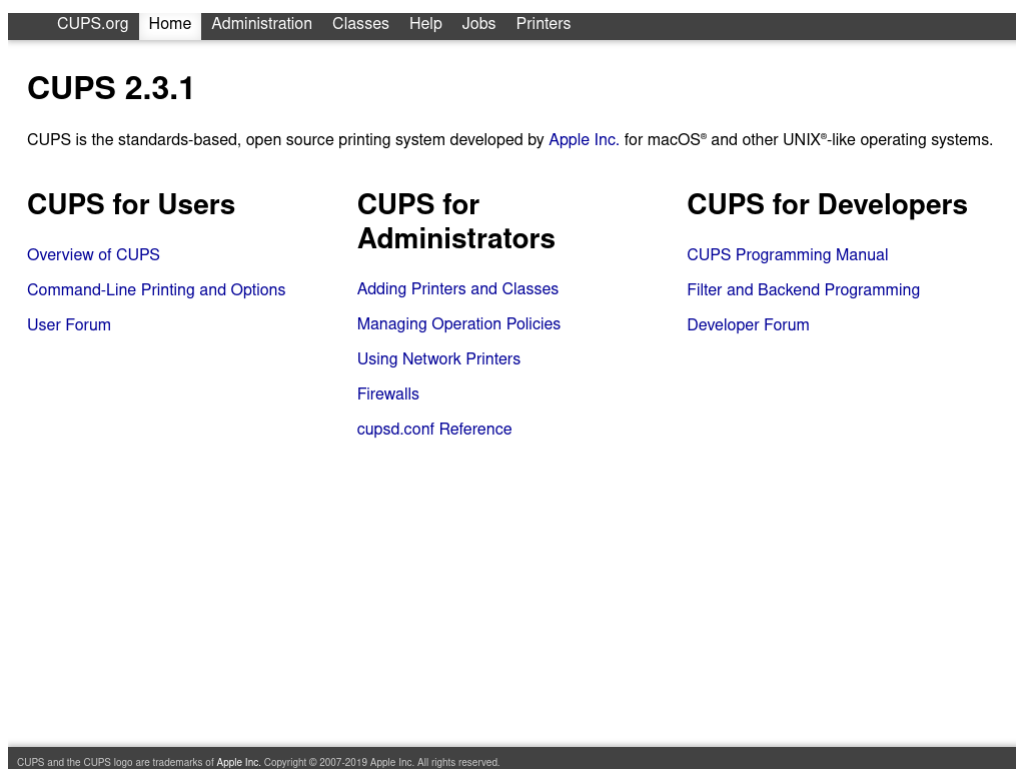
10 Printer

xhc can manage locally connected printers. These can be passed on to the system using RDP, for example.

For printer management, xhc uses the CUPS printing system. The configuration is done in a browser. After clicking the "Set up printer" button, CUPS is started in the Firefox browser. You can end the printer configuration at any time with the keys Ctrl and Q.

10.1 Add printer

Click the "Printer configuration" button in xhc. Then CUPS will start in the browser:



Click "Administration". Then this screen appears:

The screenshot shows the CUPS Administration web interface. At the top is a navigation bar with links: CUPS.org, Home, Administration (selected), Classes, Help, Jobs, and Printers. The main content area is titled "Administration" and is divided into two columns. The left column has sections for "Printers" (with buttons: Add Printer, Find New Printers, Manage Printers), "Classes" (with buttons: Add Class, Manage Classes), and "Jobs" (with button: Manage Jobs). The right column is titled "Server" and contains a button "Edit Configuration File" and a "Server Settings" section. The "Server Settings" section has a link "Advanced" followed by several checkboxes: "Share printers connected to this system" (with a sub-option "Allow printing from the Internet"), "Allow remote administration", "Use Kerberos authentication (FAQ)", "Allow users to cancel any job (not just their own)", and "Save debugging information for troubleshooting". A "Change Settings" button is at the bottom of this section. At the very bottom of the page is a small copyright notice: "CUPS and the CUPS logo are trademarks of Apple Inc. Copyright © 2007-2019 Apple Inc. All rights reserved."

Click "Add Printer".

This screenshot shows the same CUPS Administration interface as the previous one, but with a login dialog box overlaid in the center. The dialog box has a key icon and the text: "http://localhost:631 is requesting your username and password. The site says: 'CUPS'". It contains two input fields: "User Name:" and "Password:". Below the fields are "Cancel" and "OK" buttons. The background interface is dimmed, showing the same navigation bar and "Administration" section headers. The same copyright notice is at the bottom.

To be allowed to create a printer, you need the necessary rights. To do this, you must create a user. Log them in as user thinclient:

User Name: thinclient

Password: thinclient (if you have not changed the password)

The password can be changed in the Security tab.

CUPS searches for connected printers. If the printer is not found, you can create it manually.

CUPS.org Home Administration Classes Help Jobs Printers

Add Printer

Add Printer

Local Printers: ☐ CUPS-BRF (Virtual Braille BRF Printer)
☐ HP Printer (HPLIP)
☐ HP Fax (HPLIP)

Discovered Network Printers: ☐ HP Officejet Pro 8610 [5EAC55] (HP Officejet Pro 8610)
☐ HP Officejet Pro 8610 (HP Officejet Pro 8610)
☐ HP Officejet Pro 8610 (driverless) (HP Officejet Pro 8610)

Other Network Printers: ☐ Internet Printing Protocol (https)
☐ Internet Printing Protocol (ipp)
☐ Backend Error Handler
☐ Internet Printing Protocol (http)
☐ Internet Printing Protocol (ipps)
☐ AppSocket/HP JetDirect
☐ LPD/LPR Host or Printer

Continue

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After selecting the printer, click "Continue". Now you need to give the printer a name:

CUPS.org Home Administration Classes Help Jobs Printers

Add Printer

Add Printer

Name:
(May contain any printable characters except "/", "#", and space)

Description:
(Human-readable description such as "HP LaserJet with Duplexer")

Location:
(Human-readable location such as "Lab 1")

Connection: socket://192.168.0.9:9100|HP Officejet Pro 8610

Sharing: ☐ Share This Printer

Continue

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After entering a name, click "Continue":

Set Printer Options

Set Default Options for HP_Officejet_Pro_8610

[General](#) [Banners](#) [Policies](#)

General

Media Size:	A4
Media Type:	Stationery
Print Color Mode:	Color
2-Sided Printing:	Off
Print Quality:	Normal
Print Optimization:	Automatic
Print Rendering Intent:	Automatic
Print Scaling:	Automatic
<input type="button" value="Set Default Options"/>	

Now you can still change various parameters. Click "Set Default Options" to apply the settings.

CUPS.org Home Administration Classes Help **Jobs** Printers

HP_Officejet_Pro_8610

[HP_Officejet_Pro_8610](#) (Idle, Accepting Jobs, Not Shared)

Maintenance Administration

Description: HP Officejet Pro 8610

Location:

Driver: HP Officejet Pro 8610, driverless, cups-filters 1.27.4 (color, 2-sided printing)

Connection: socket://192.168.0.9:9100

Defaults: job-sheets=none, none media=iso_a4_210x297mm sides=one-sided

Jobs

Search in HP_Officejet_Pro_8610:

Jobs listed in print order; held jobs appear first.

The printer is now created in the system and can be used:

On the Internet you can find more documentation about the Linux printing system CUPS.

10.2 Error handling

If the printer does not respond, you can see in the job list if print jobs are not yet done. You can then delete print jobs via "Cancel". To do this, click on "Jobs":

[CUPS.org](#) [Home](#) [Administration](#) [Classes](#) [Help](#) [Jobs](#) [Printers](#)

Jobs

Search in Jobs:

Jobs listed in print order; held jobs appear first.

ID	Name	User	Size	Pages	State	Control
HP_Officejet_Pro_8610-1	Unknown	Withheld	1k	1	processing since Fri Apr 16 06:54:33 2021 "Rendering completed"	<input type="button" value="Cancel Job"/> <input type="button" value="Move Job"/>

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You can also start a test print or stop and restart a printer. To do this, click on "Printers" and click on the desired printer. Via "Maintenance" you can perform the mentioned actions.

[CUPS.org](#) [Home](#) [Administration](#) [Classes](#) [Help](#) [Jobs](#) [Printers](#)

HP_Officejet_Pro_8610

HP_Officejet_Pro_8610 (Idle, Accepting Jobs, Not Shared)

Maintenance

Administration

Description: HP Officejet Pro 8610

Location:

Driver: HP Officejet Pro 8610, driverless, cups-filters 1.27.4 (color, 2-sided printing)

Connection: socket://192.168.0.9:9100

Defaults: job-sheets=none, none media=iso_a4_210x297mm sides=one-sided

Jobs

Search in HP_Officejet_Pro_8610:

Jobs listed in print order; held jobs appear first.

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11 Configuration without GUI

It is possible to configure xrc without the "Thinclient" dialog.

The configuration via a file can be done before or after an installation.

11.1 Configuration before installation

This procedure is intended for use with a Raspberry Pi.

A configuration file and, if desired, also a file with connection parameters can be copied into the `/data/thinclient` folder.

After starting xrc, the data from both files are transferred to the system.

The file names for the configuration files are predefined and are called:

`thinclient.config` for the configuration files

`connection.config` for the file with the connection parameters

Note: the easiest way is to use an existing connection parameters file. The connection file is located in the `/data/thinclient` folder and is named `connection.conf`.

11.2 Write configuration file to /boot

Example for Ubuntu (the names of the partitions can be different):

1. `sudo losetup -Pf xrc.img`
2. `sudo fdisk -l`
Output fdisk:

Device	Boot	Start	End	Sector	Size	Typ
<code>/dev/loop10p1</code>		8192	532479	524288	256M	c W95 FAT32 (LBA)
<code>/dev/loop10p2</code>		532480	15759359	15226880	7,3G	83 Linux
<code>/dev/loop10p3</code>		2048	8191	6144	3M	83 Linux
3. The `/data` partition starts from position 2048. Mount it:
`sudo mount /dev/loop10p3 /mnt`
4. Copy the configuration file to the `/mnt/thinclient` folder. The file must have the name `thinclient.config`.
5. Adjust the file permissions of the configuration file:
`chmod a=rw /mnt/thinclient/thinclient.config`
6. Unmount partition: `sudo umount /mnt`

11.3 Configuration after installation

Create a configuration file in the `/data/thinclient` folder named `thinclient-config`.

Restart the system. Depending on whether xrc is in user or administrator mode, the system restarts several times. After that, the system is configured according to the defaults in the `thinclient-config` file.

11.4 Construction Configuration file

A configuration file consists of many parameters with values. A line consists of one parameter with one value. Between parameter and value, the "=" sign is used as the assignment operator.

Example: `system_ssh = on`. The value "on" is assigned to the "system_ssh" parameter.

11.5 Parameters and their meaning

11.5.1 System

system_name

Entering a system name (hostname).

system_vnc

Switches the VNC remote connection on or off.

Possible Values:

on: Switch on the VNC server

off: VNC server do not turn on

system_vnc_password

Password for VNC remote access. Is necessary when `system_vnc=on`.

Possible values: Any password.

system_ssh

Switch the SSH server on or off.

Possible values:

on: Switch on the SSH server

off: SSH server do not turn on

system_ssh_password

Password for SSH access. Is necessary when `system_ssh=on`.

Possible values: Any password.

system_admin

Starts xtc in administrator or user mode.

Possible values:

on: Start in administrator mode

off: Start in user mode

system_admin_password

Password for administrator mode. Necessary if `system_admin=off`

Possible values: Any password

system_language

Display language of xtc.

Possible values:

English: The display language is English

Deutsch: The display language is German

Italiano: The display language is Italian

system_keyboard

Specification of the keyboard layout.

Possible values: Specified by the system. example "de" For a DGerman keyboard, "us" For a American keyboard layout.

system_numerickeypad

Turn on numeric pad when xtc starts.

Possible values:

yes: Enable numeric keypad

no: Switch off numeric keypad

system_usbautomount

Automatic integration of a USB stick.

Possible values:

on: The UST stick is integrated automatically.

off: USB stick is not automatically integrated.

system_oneninedesign

Activates the software for the housing of One nine design (only for Raspberry Pi 4).

Possible values:

on: Activate software.

off: Software disable.

system_argon1

Activates the software for the enclosure Argon One (only for Raspberry Pi 4).

Possible values:

on: Activate software.

off: Software disable.

system_startminimized

Starts the dialog minimized.

Possible values:

yes: Start dialog minimized.

no: Do not start dialog minimized.

system_soundcard

Selection of the Sound card.

Possible values:

The first character of the output medium must be specified. See the corresponding selection list in the dialog.

11.5.2 Network

system_networksave

Indicates whether network settings are saved.

Possible Values:

yes: Save network settings.

no: Do not save network settings.

network_typ

Specification of the network configuration.

Possible values:

dhcp: The IP address is assigned by a DHCP server.

static: The IP address is entered in the system.

network_interface

Specification of the network interface to be used.

Possible values:

Name of the network card. As specified by the system.

network_address

Specification of the system's IP address. Only makes sense if **network_typ=static**.

Example: 192.168.0.20

network_subnetmask

Specification of the system's subnet mask. Only makes sense if **network_typ=static**.

Example: 255.255.255.0

network_gateway

Specification of the IP address of the gateway. Only makes sense if **network_typ=static**.

Example: 192.168.0.10

network_dns

Specification of the IP address of the DNS server. Only makes sense if **network_typ=static**.

Example: 8.8.8.8

network_wlan_ssid

Specification of the SSID of the WLAN to be used.

network_wlan_password

Specification of the password for the SSID.

11.5.3 Monitor

monitor_screensaver

Turns the screen saver on or off.

Possible values:

on: Activate the screen saver.

off: Switch off the screen saver.

monitor_standby

power saving mode turn the monitor on or off.

Possible values:

on: Switch on energy saving mode.

off: Switch off energy saving mode.

monitor_resolution

Specification of the screen resolution.

Possible values:

automobile: Automatic determination of the screen resolution.

The other values result from the possibilities of the monitor. Example: 1024x768

monitor_resolution2

Specification of the screen resolution for the second monitor.

Possible values:

automobile: Automatic determination of the screen resolution.

The other values result from the possibilities of the monitor. Example: 1024x768

monitor_orientation

Logical position of the first monitor.

Possible values:

left: Monitor left

right: Monitor right

above: Monitor above

below: Monitor below

monitor_optimizegraphic

If there are problems with the graphics display, this option should be switched on. This means that the driver "vc4-fkms-v3d" for the graphics card is not loaded. However, dual monitor operation is no longer possible with this.

Possible values:

yes: Do not load driver

no: load driver

11.5.4 VPN

vpn_program

VPN program to use.

Possible values: **wireguard** or **openvpn**.

vpn_configfile

Name of the parameter file from OpenVPN or WireGuard. The file path must also be specified: **/data/vpn**

vpn_runfile

Name of the script to execute OpenVPN or WireGuard. The file name is fixed: **/data/vpn/vpn.sh**

vpn_parameter

Additional parameters for openvpn. See documentation for the openvpn server.

vpn_autostart

Connect VPN automatically after system start.

Possible values:

yes: Connect automatically

no: Don't connect automatically

vpn_systemlogin

Show login dialog when VPN is started.

Possible values:

yes: Show login dialog

no: Do not show the login dialog

vpn_otp

Prompt for one-time password in login dialog when VPN is started.

Possible values:

yes: Prompt for one-time password

no: Do not query one-time password

11.5.5 Date/Time

time_set

Change the date and time in the system.

Possible values:

yes: Change the date and time

no: Do not change the date and time

time_show

Show the date and time in the panel.

Possible values:

yes: Show the date and time

no: Do not show the date and time

time_time

Date and time to be set after the system start.

Possible values: Date and time in the format: day-month-year hour: minute

Example: 2020-12-28 14: 30

time_automatic

Set date and time automatically. Only makes sense if **time_set=yes**.

Possible values:

yes: Set date and time automatically.

no: Do not set the date and time automatically.

time_ntp

Specification of a time server. Example:0.pool.ntp.org. Only makes sense if **time_set=yes**.

time_execute

Take action.

Possible values:

yes: Take action

no: Take no action

time_repeat

Repeat action.

Possible values:

yes: Action is repeated

no: Action is only carried out once

time_action

Action to be carried out.

Possible values:

shut down: Shut down the system

reboot: Restart the system

time_at

Date and time when the action should be carried out.

Possible values:

Date and Time: in year-month-day hour: minute format. Example: 2020-12-31 17:30

Specification ZeitPoint: in the format: + hour: minute. Example. +03: 15. Meant: Action will be taken 3 hours and 15 minutes after the system starts.

11.5.6 Security

security_simplemenu

Use simple context menu or default context menu.

Possible values:

yes: Simple context menu.

no: Standard context menu.

security_virtualconsole

Allow virtual consoles.

Possible values:

yes: Virtual consoles allowed.

no: No virtual consoles.

security_root_password

Enter a password for the "root" user.

security_user_password

Enter a password for the "thinclient" user.

11.6 Example

Here is an example of a configuration file:

```
system_networksave=yes
network_typ=static
network_interface=eth0
network_address=192.168.7.28
network_subnetmask=255.255.0.0
system_vnc=on
system_vnc_password=thinclient
system_ssh=on
```

```
system_ssh_password=thinclient  
system_language=German  
system_keyboard=de  
monitor_screensaver=yes  
monitor_standby=yes
```

This example configures the eth0 network card with the IP address 192.168.7.29 and the subnet mask 255.255.0.0. The VNC server and the SSH server for remote administration are switched on, the password for both is "thinclient".

The display language is "German". The keyboard layout is for a German keyboard.

The screen saver and energy saving mode are switched on.

12 Others

12.1 Context menu

The mouse has a context menu (click with the right mouse button).

The context menu has these menu items:

terminal emulator: Selecting this menu item starts a terminal.

Restart xtc: If the "Thinclient" dialog no longer reacts, it can be restarted by selecting this menu item.

Exit: By selecting this menu item, the graphical user interface (openbox) can be closed. Then the console of the Systems displayed.

Note: If the "Simple context menu" switch in the "Security" tab is enabled, there is only the **Restart txt** menu item.

12.2 Raspberry Pi: Exchange Pi 3 for Pi 4

You are using xtc in a Raspberry Pi 4 and want to use the SD card in a Raspberry Pi 3 (or vice versa). To do this, xtc must be run in administrator mode. If xtc is run in user mode and you replace the Raspberry Pi 4 with a Raspberry Pi 3 (or vice versa) the system will not start. You will get an error message.

The reason is the ramdisk which is needed for the overlay file system. This must be adapted to the system. This is only possible in administrator mode (i.e. without Overlay File System).

12.3 Test Webcam

You have connected a webcam and want to know if it works:

1. Open a terminal. To do this, select "Terminal emulator" in the context menu or click the "Terminal" button in the "Settings" tab.
2. Type in the terminal: `guvcview`
3. Press the <return> key
4. The application will start and should display a camera image.

13 Installation for experts

The following sections explain how to prepare a memory card, install the operating system and then xrc. This procedure is only necessary if you want to make your own changes to the system. All the commands listed are described for a Linux system.

13.1 Copy the operating system to the SD card

To create the operating system and data partition use the script `createsd.sh`.

The script is located in the `xrcbin.tar.gz` file in the `xrc` folder.

Start the script in a terminal with these parameters:

```
sudo xrc/createsd.sh <SD device name> <image Raspberry OS>.
```

<SD device name> is the device name of the SD card is, e.g. `/dev/sb`

<Image Raspberry OS> is the name of the ISO file containing the image of Raspberry OS.

This script is used to copy the operating system to the SD card and creates another partition.

13.2 Raspberry OS configure

Start the Raspberry Pi with the SD card.

Login as user "pi":

Log in: pi

Password: raspberry

13.3 Optional: Set the password for "root"

Inputbut: `sudo passwd`

After that wishright password enter.

Optional: set the German keyboard

Input: `sudo raspi-config`

Select in the application menu:

4 Localization Options

I3 Change Keyboard Layout

Select keyboard layout "German".

Restart Raspberry Pi: `sudo reboot`

14 xrc on Raspberry Pi 3 or Pi 4 to install

It becomes the file `xrcbin.tar.gz` needed.

1. file `xrcam.tar.gz` copy it to the Raspberry Pi.
2. Extract file: `tar xvfzp xrcam.tar.gz`
3. installation as root start: `sudo sh xrc/install.sh`

Attention: Internet access is required for installation.

After the installation, the Raspberry Pi must be restarted.

14.1 Installation details

- During installation various packages are installed.
- The graphical user interface with "openbox" is installed as the desktop.
- The users "thinclient" and "thinclientssh" created.
- The preset User "pi" is removed.
- An ssh server will be installed.
- A VNC server will be installed.
- The file `/etc/sudoers` becomes "thinclient" for the user to different scripts expanded.
- The user "thinclient" is configured as an autologin.
- It will be the files `/etc/init.d/thinclient_start` and `/etc/init.d/thinclient_shutdown` Installed. These scripts configure xrc.
- The file `.bashrc` in the folder `/home/thinclient` is supplemented by the start of the graphical user interface.
- The Partition `/` and `/boot` are changed to "read only".
- The folders `/tmp` and `/home` are configured as a temporary file system.
- On the folder `/data` can also be accessed by writing.
- The application for the thin client can be found in the folders:
 - `/opt/thinclient/bin`: application to configure the connections.
 - `/opt/thinclient/scripts`: Scripts
 - `/opt/thinclient/config`: System parameter
 - `/var/thinclient/home`: Home directory of the user thinclient
 - `/data/thinclient`: Configuration files
- File with connection parameters: `/data/thinclient/connection.conf`

15 Details about xtd

15.1 General

- xtd is based on the Raspberry OS Light operating system (Debian without graphical user interface) or Ubuntu Server.
- In order to easily configure clients (VNC, RDP, etc.), the graphical user interface "openbox" is used.
- After starting the Raspberry Pi, there is an automatic login as a "thinclient" user. This starts the graphical user interface and the "thinclient" application. The connections are configured with the "thinclient" application.
- To establish a connection to a server, the "thinclient" application calls external applications (client applications such as vncviewer, xfreerdp, x2go) using a system command.
- The file system is only integrated for reading. To enable necessary write access, the folders /tmp and /home are configured as temporary file systems. This means that after a restart the contents of these folders will be lost. The folder /data can be the only one Folder in File system.
- Passwords are stored encrypted according to SHA-256.

15.2 Sourcecode

The source code can be found in the file xtdbin.tar.gz. You can download this file from

<https://www.vmfreen.org/xtd>

("Download for Ubuntu Server") or click here:

<https://www.vmfreen.org/xtd/downloads/xtdbin.tar.gz>

Unzip the file. The source code is located in the bin folder.

15.3 Preset passwords

<i>user</i>	<i>password</i>
root	root
thinclient	thinclient

15.4 External access with ssh

The Raspberry Pi can be accessed with ssh. As a user becomes thinclientssh used.

To do this, ssh must be activated in the "System" tab and a password assigned to the user.

15.5 Changes to the file system

Make the file system writable:

```
sudo mount -o remount, rw/  
sudo mount -o remount, rw /boot
```

Need changes in the folders /tmp or /home must be carried out, the file /etc/fstab changed so that these folders are not a temporary file system:

Change of:

```
tmpfs      /tmp      tmpfs nodev, nosuid 0 0
tmpfs      /home/thinclient tmpfs nodev, nosuid 0 0
```

after:

```
#tmpfs     /tmp      tmpfs nodev, nosuid 0 0
#tmpfs     /home/thinclient tmpfs nodev, nosuid 0 0
```

The system must then be restarted: `reboot`

15.6 Changes in /home/thinclient

The file system must be made writable (see section "Changes in the file system").

The changes in the home directory of the user "thinclient" must be in the folder

`/var/thinclient/home/thinclient`

be performed. The contents of this folder will be in the folder when the system starts

`/home/thinclient` copied there `/home` a temporary file system and this is empty at system start.

Raspberry Pi Desktop (Raspberry Pi 3) element14 offers a housing for the Raspberry Pi. An on / off switch is included. This makes the Raspberry Pi in conjunction with xrc aDesktop pc.

In order to use the on/off switch, a software package must be installed. This mustss after the installation and update dit operating system. The software package is in the folder `/opt/thinclient/desktop` contain.

Link to the manufacturer: <http://element14.com>

15.7 Installation of Pi desktop software

Execute in the console of the Raspberry Pi:

```
sudo mount -o remount, rw /
sudo mount -o remount, rw /boot
sudo dpkg -i /opt/thinclient/desktop /pidesktop-base-1.1.0.deb
```

16 Installation xfreerdp Release 3

xfreerdp version 3 is still under development, see <https://www.freerdp.com/>

16.1 Installation für Ubuntu 20.04

Download from

<https://ci.freerdp.com/job/freerdp-nightly-binaries/architecture=amd64,distribution=focal,label=pkg-deb/>

download the current package. Search for **freerdp-nightly_3.0.0...amd64.deb**

Copy the file to the computer where xrc is installed.

Open a terminal.

Execute this command: `sudo dpkg -i freerdp-nightly_3.0.0...amd64.deb`

xfreerdp version 3 will now be installed.

16.2 Installation for Raspberry Pi

For the Raspberry Pi, xfreerdp version 3 must be compiled by yourself.
Download from

<https://github.com/FreeRDP/FreeRDP>

the current source code.

Copy the file to your Raspberry Pi.

Open a terminal.

Run these commands to compile the program (the system must be in administrator mode):

```
unzip FreeRDP-master.zip  
cd FreeRDP-master.zip  
sudo /opt/thinclient/script/compxfreerdp.sh
```

The source code is compiled and xfreerdp version 3 is installed.