

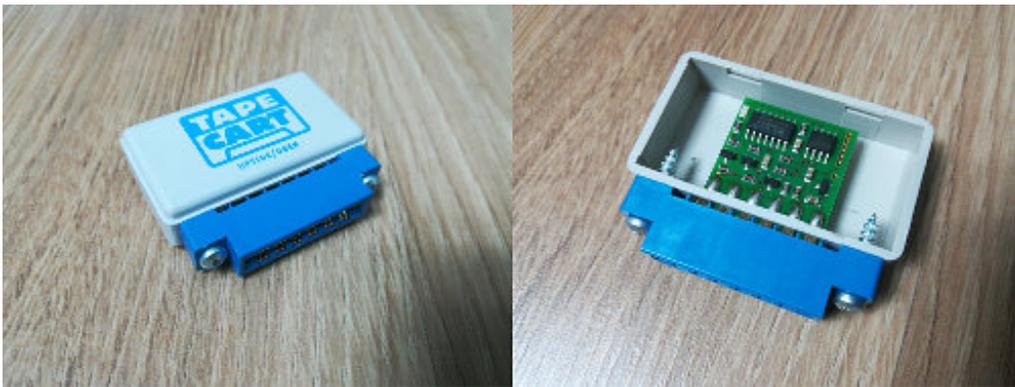
The tape cart for the Commodore 64

mingos-commodorepage.com/tutorials/c64tapecart.php

What is needed?

- C64
- Tape Cart
- SD2IEC or 1541U
- Various software (see text)

What is the tape cart? Tape Cart is a module that can take up to 2Mb of data. It is connected to the Datasette port and is ready for use immediately. The hardware is useful as a data storage for programs that are needed again and again. What the tape cart can do and how data is stored on it is shown here.



Click on the image to enlarge
Scope of this manual

The tape cart is a simple memory but the functionality is bigger than you think. All features are not presented here, just the most important, with a focus on creating the program collection.

Advantages and disadvantages

First of all, the pros and cons of this hardware

Advantages:

- + Cheap (20 €)
- + Easy operation (for storing individual programs)
- + Can be described directly on the C64
- + Reading speed up to 10,000 B / Sec

Disadvantages:

- Storage process takes a long time

- An image including file browser must be created on the PC and is quite complicated for beginners (for storing program collections)
- For description / dumping of the entire memory, an SD2IEC or 1541 Ultimate is required

Die Slideshow

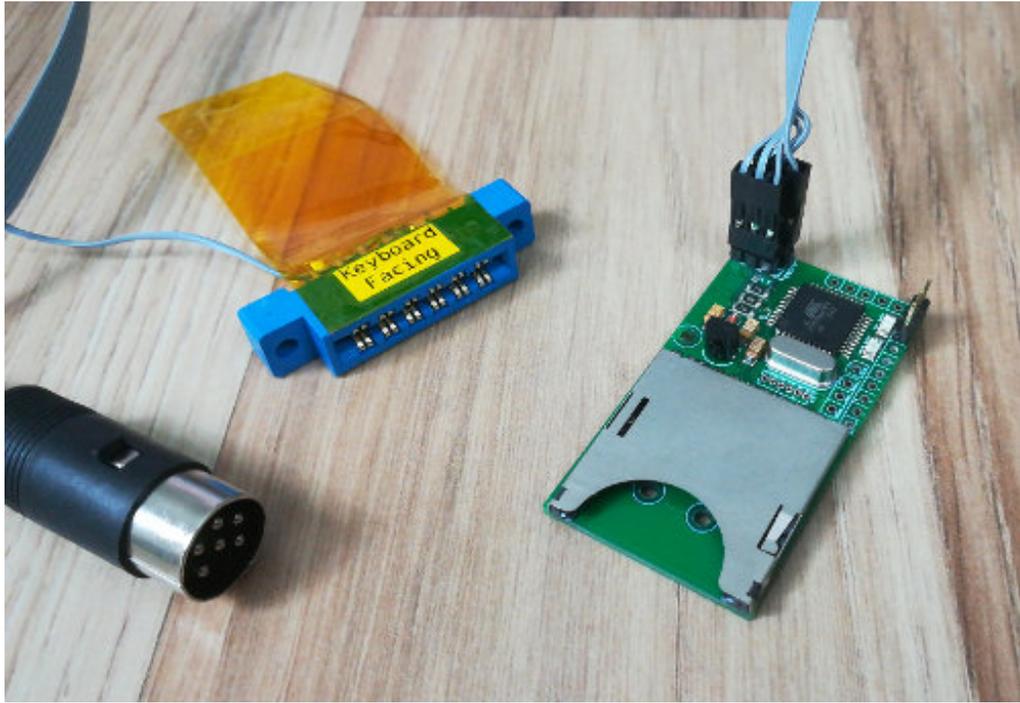
On the tape cart module is a slide show from the factory with lots of pictures. To start this, we put the tape cart (with the C64 turned off) to the datasette port. Then we turn on the C64 and load the program as from a normal cassette, so with the following command: LOAD



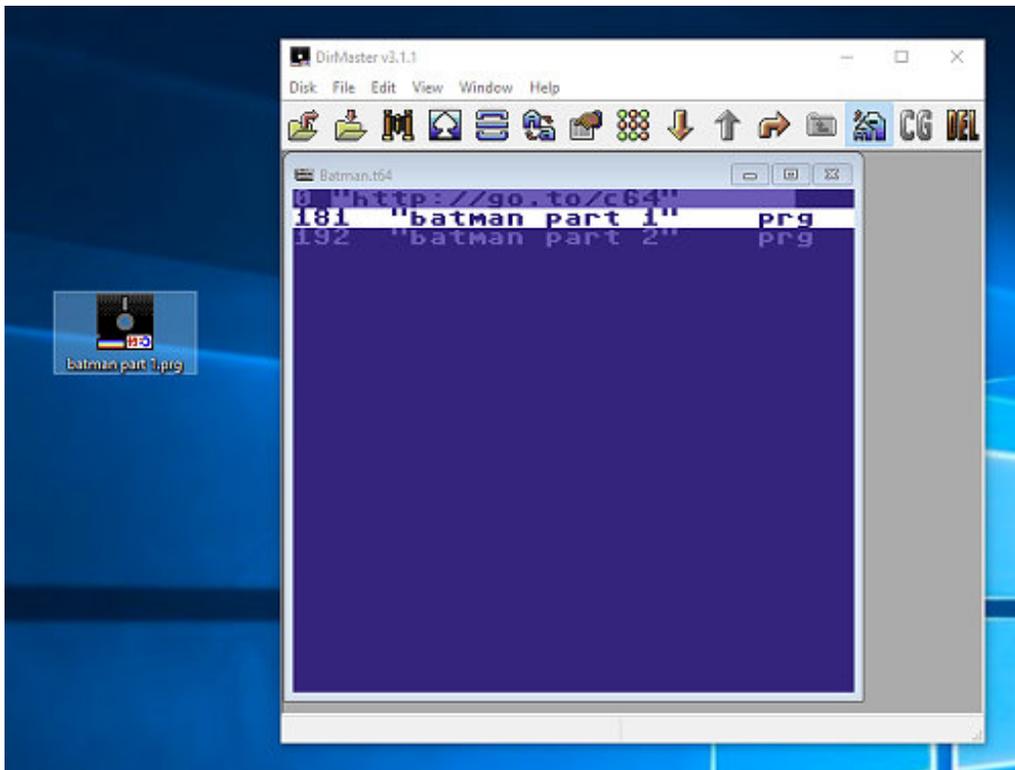
The slideshow will be started. If we copy other data to the module, the slideshow will be overwritten and can no longer be executed. How to copy the slideshow back to the tape cart is below.

The PRG files

We can either fill the entire memory with data, or just copy a single program onto it, as described below. Since the tape cart does not have an SD card slot, the programs must first somehow get to the C64. The most common method is to use an SD2IEC or 1541U.



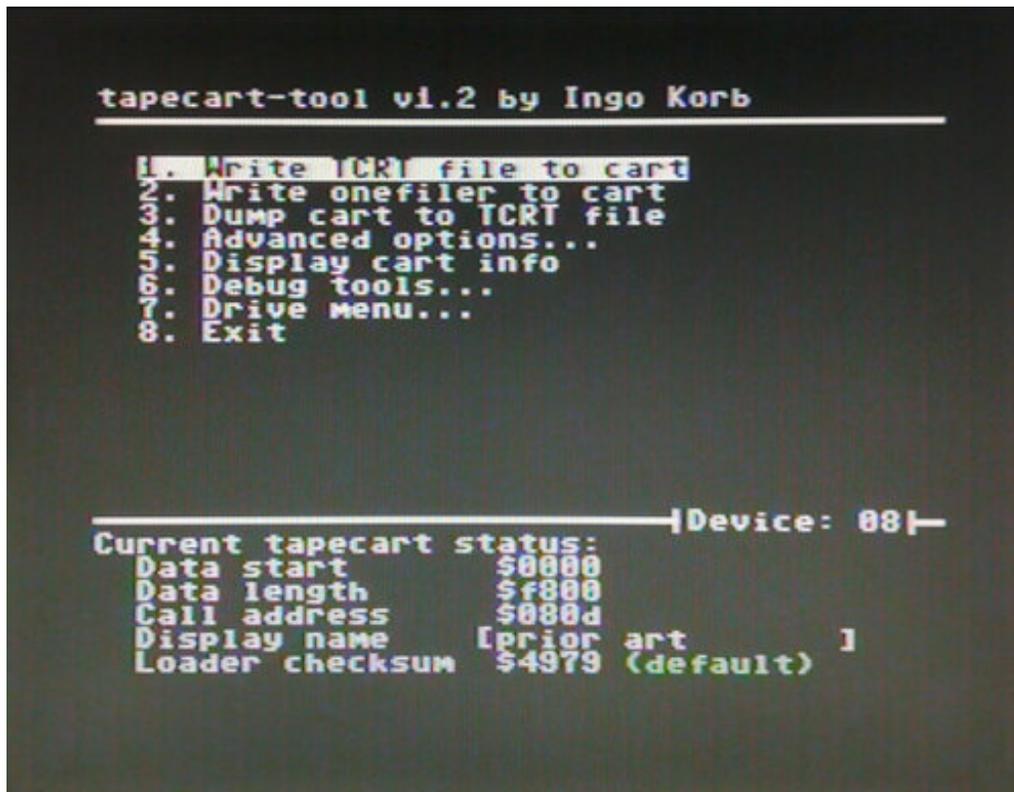
The data can then be transferred directly from the SD2IEC or from an integrated D64 file. If we have an image (such as a T64) that is not supported by the SD2IEC, then the PRG file located on it must be extracted. The program Dir-Master is very well suited for that. Simply drag the desired image into the window of Dir-Master and then drag the required PRG file onto the desktop.



Click on the image to enlarge

Write a single program to memory

To write to the memory, a small C64 software is needed. The "Flashtool" consists of a clear menu, with which the most important tasks can be accomplished. The Flashtool can be found on the github page github.com/ikorb/tapecart . At the C64 the program looks like in the following picture.



```
tapecart-tool v1.2 by Ingo Korb
-----
1. Write (03) file to cart
2. Write onefiler to cart
3. Dump cart to TCRT file
4. Advanced options...
5. Display cart info
6. Debug tools...
7. Drive menu...
8. Exit

-----|Device: 08|-----
Current tapecart status:
Data start      $0000
Data length     $f800
Call address    $080d
Display name    [prior art      ]
Loader checksum $4979 (default)
```

In order to be able to write a single program to the memory, we first have to specify on which drive the PRG file that we want to upload is located. To do this, we go to the "Drive Menu ..." or menu item 7 and then we select item 1 "change current drive".

```
tapecart-tool v1.2 by Ingo Korb
-----
Change current device
Device number: [08]

Enter 0 to select REU

-----|Device: 08|-----
Current tapecart status:
Data start      $0000
Data length     $f800
Call address    $080d
Display name    [prior art      ]
Loader checksum $4979 (default)
```

Here we now enter the device address of the drive on which the data is located. "00" stands for REU, if such an extension is used. The selected drive remains stored even if the computer is turned off. Now we go back to the main menu where we select item 2 "write onefiler to cart". In the command prompt we enter the name of the file (with file extension) that we want to load into memory and confirm with Enter. Now we are asked at which address the file should be placed in memory.

```
tapecart-tool v1.2 by Ingo Korb
-----
Write onefiler
File name: [christmas.prg ]
Load address is $0801
Use BASIC starter? (Y/N)

-----[Device: 08]-----
Current tapecart status:
Data start      $0800
Data length     $f800
Call address    $080d
Display name    [prior art ]
Loader checksum $4979 (default)
```

"Y" The file is saved with the address \$ 0801 (Basic Memory). The program can be loaded later with a normal LOAD command.

"N" A custom address can be specified. The save process takes a while, depending on the size of the file.

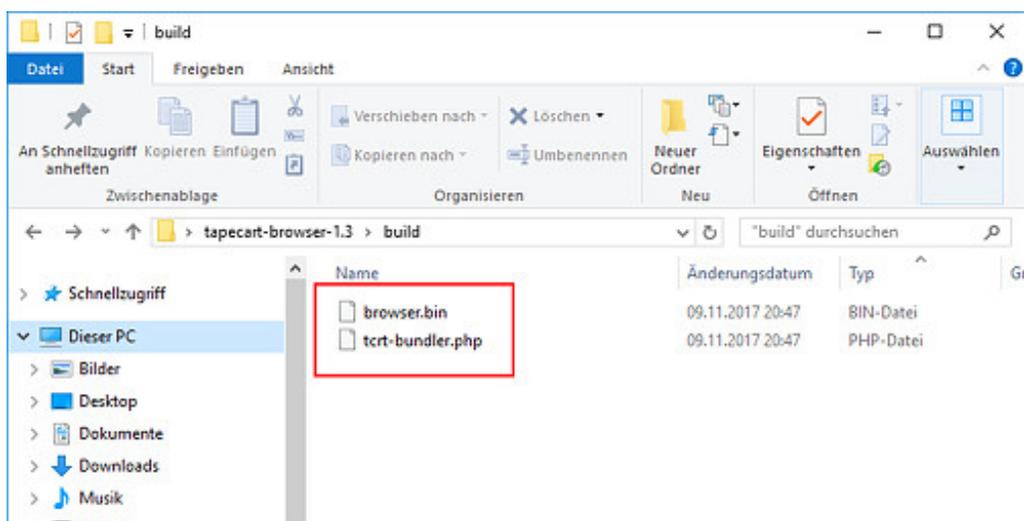
```
tapecart-tool v1.2 by Ingo Korb
-----
Write onefiler
File name: [christmas.prg ]
Load address is $0801
Use BASIC starter? (Y/N) y
Writing page 60 [$083c00]

-----[Device: 08]-----
Current tapecart status:
Data start          $0000
Data length         $f800
Call address        $080d
Display name        [prior art ]
Loader checksum     $4979 (default)
```

Only the program can be loaded from the tape cart with the command "LOAD". Assuming the program has been saved with the address \$ 0801.

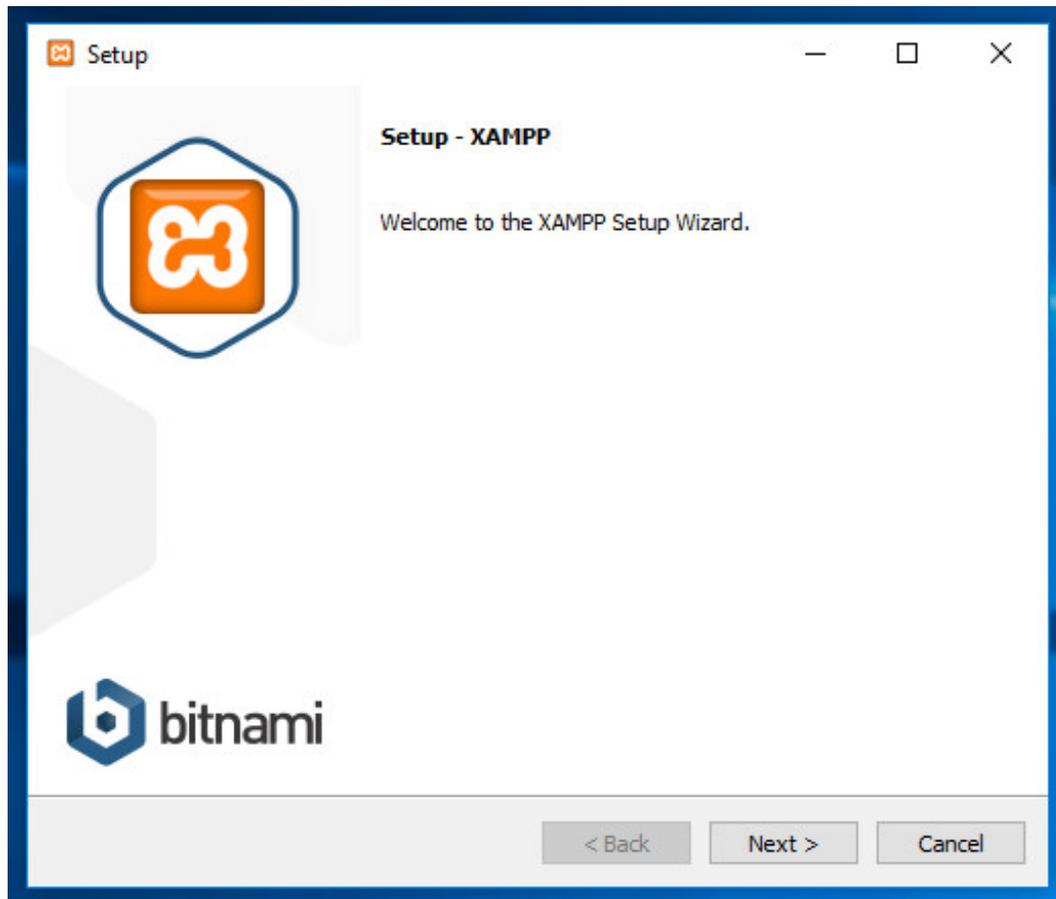
Write a program collection in memory

Unlike storing individual programs, assembling entire collections is more complicated and time consuming. The desired data must first be summarized in a single TCRT image before they can be stored on the tape cart. This is done with a PHP script called "tcrt-bundler.php" which can be downloaded here: github.com . A file browser is also included and will be integrated into the TCRT image to be created.

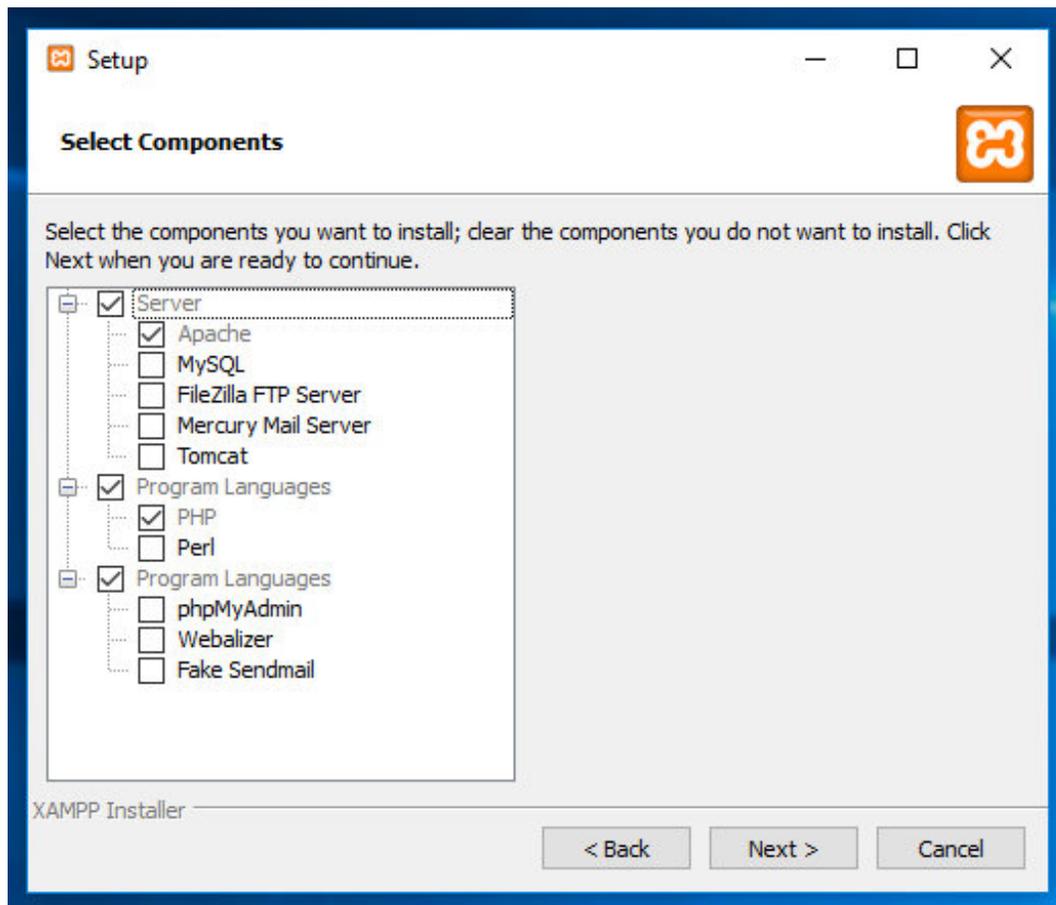


Click on the image to enlarge

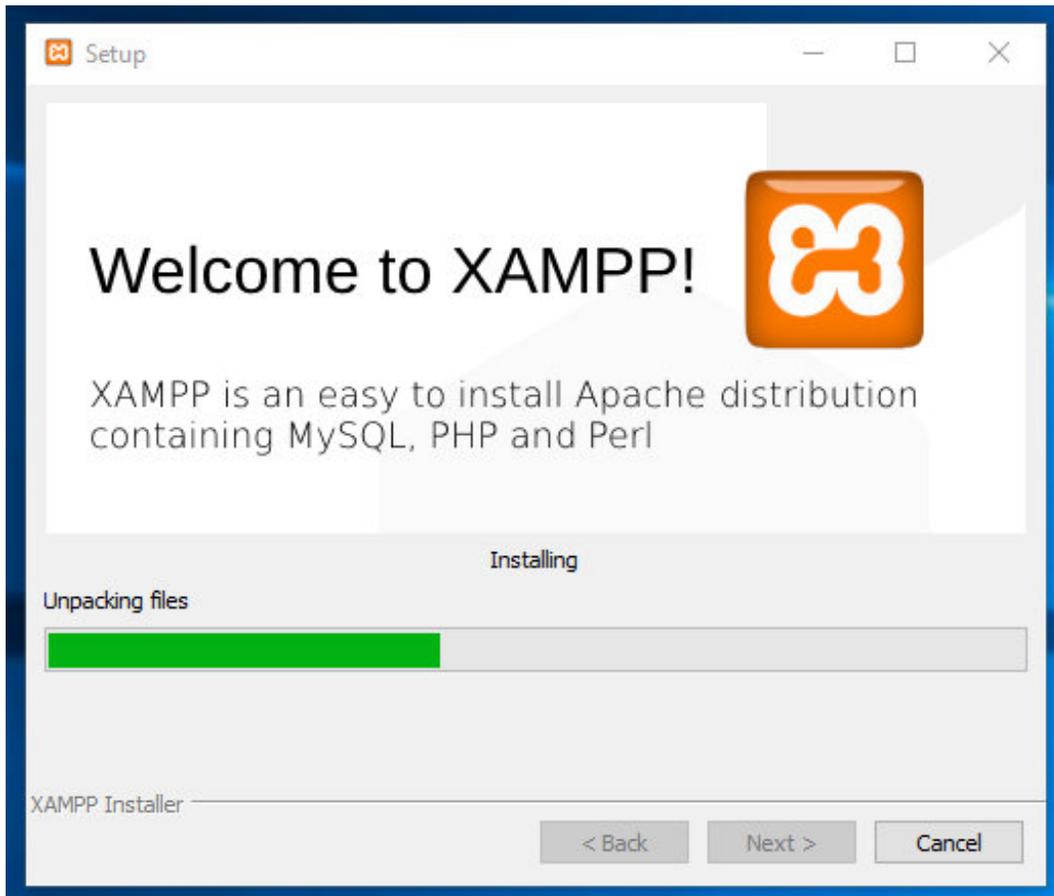
Of course the script can not be executed without PHP, which means we have to get this first. The easiest way is with the preconfigured server package Xampp. Xampp is free and available for Windows, MacOS and Linux ([download here](#)). We download the current version for the desired operating system, in this example for Windows. Then we start the installation. The installation wizard complains that due to user account control (UAC), some features may not be available. That should not bother us, because we will not use them anyway.



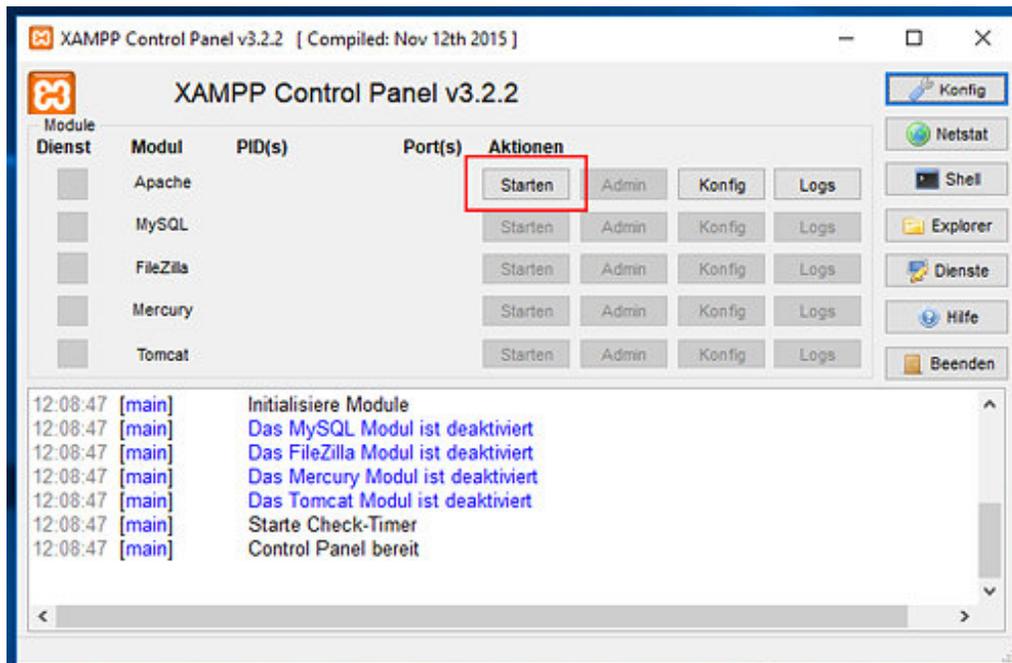
In the selection menu of the components to install, we can disable everything except the Apache server and PHP. We do not need the rest.



Now we click on "Next" until the installation starts.

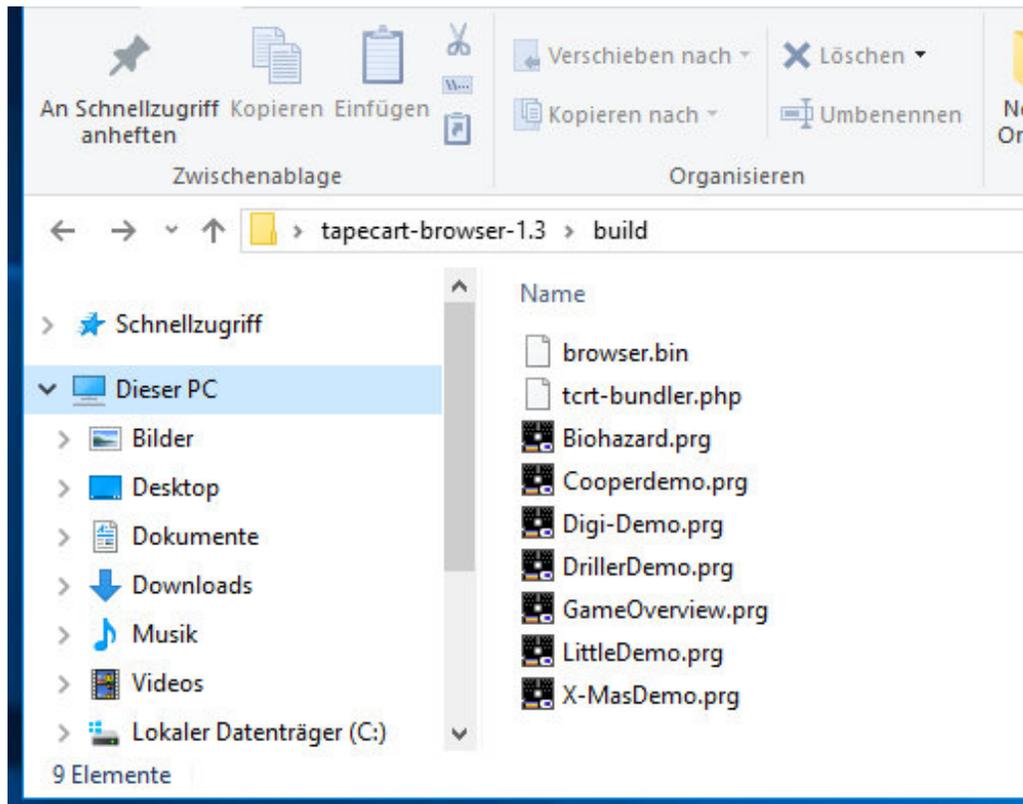


At the end we confirm the completion of the installation with "Finish". The control panel should open. Here we start the Apache server.

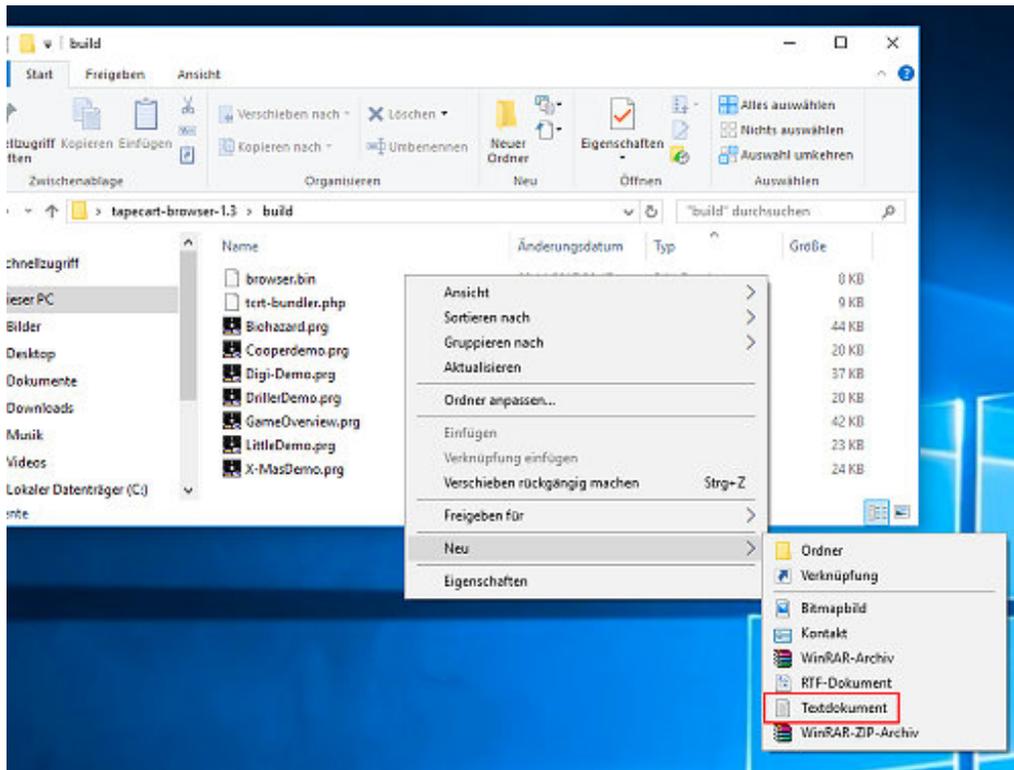


Click on the image to enlarge

Now it goes on with the PRG files we want to save on the tape cart. In the folder containing the script "tcrt-bundler.php" (tapeart-browser-1.Xbuild), we copy all the PRG files we need. Note that only 2Mb of data is available on the tape cart.



Next we'll create a text file named "input.txt" in the same directory. To do this, right-click on a free space in the folder and then on "New -> Text Document".



Click on the image to enlarge

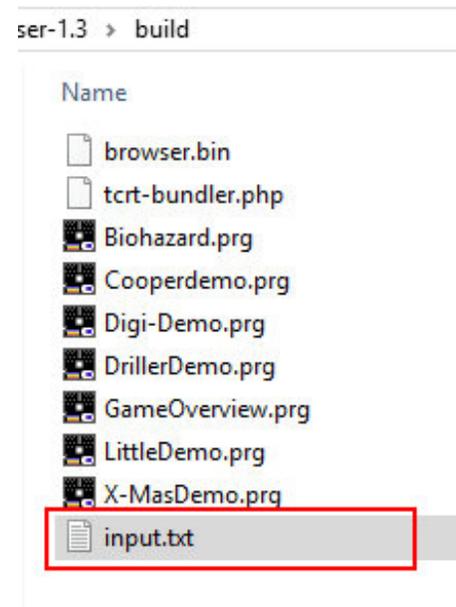
Attention! Only a pure text file may be created, not RTG-DOC or other file formats. In the text file we now write all file names of the PRG files according to the following patterns:

Filename; Menu name; Memory address

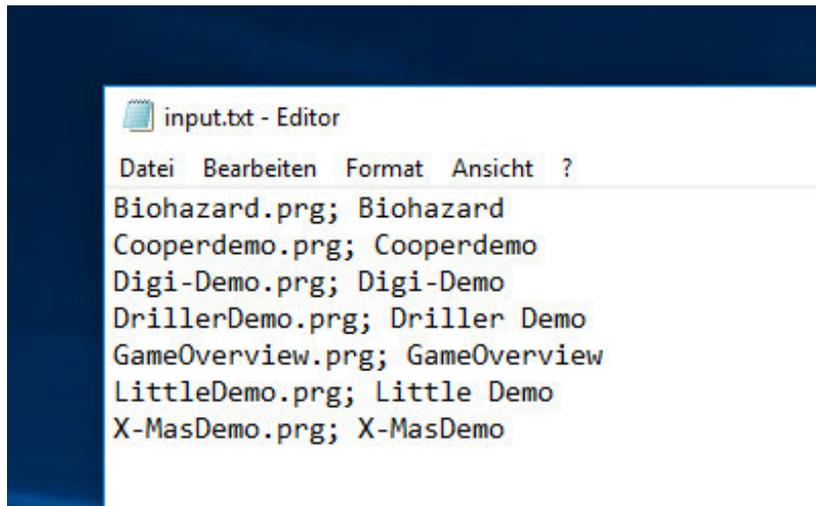
The memory address is optional and is only needed if we want / need to store a file in a specific location.

Depending on the address, the icon also changes in the menu of the browser. Note that files with some addresses are not displayed in the menu. All available (optional) addresses are listed here:

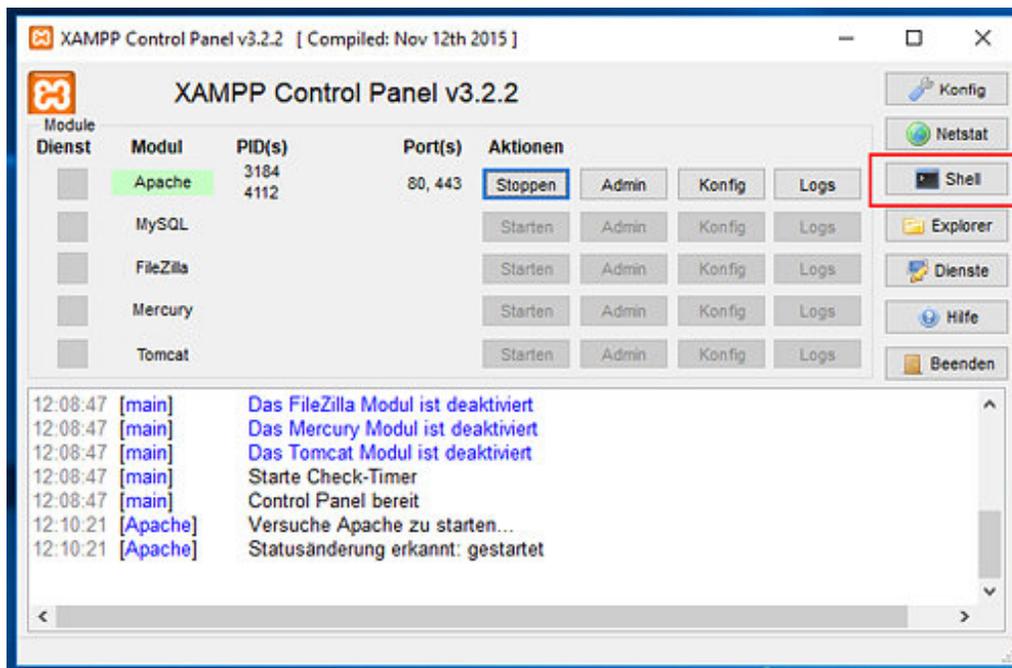
github.com/alexkazik/tapecart-browser .



But since we only use normal executable programs for our first test, we do not use the address. The text file "input.txt" looks like this in my case:



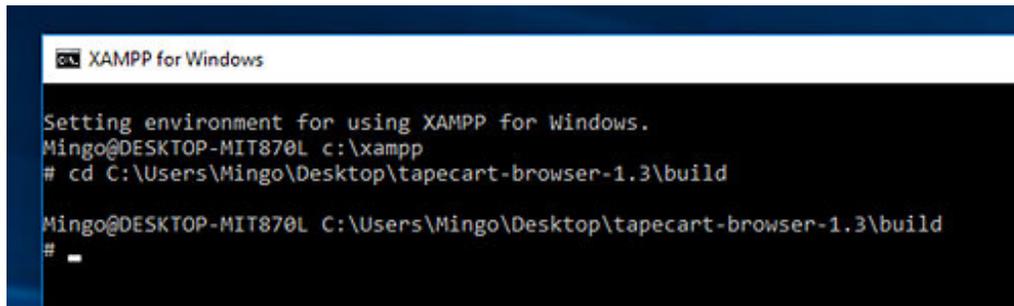
Finally, we have prepared everything and can now start creating the TCRT file. Again we open the control panel of Xampp and open the shell .



Click on the image to enlarge

Once there, we switch to the directory "tapecart-browser-1.Xbuild" which in my case is on the desktop:

```
cd [path to directory]
```

A screenshot of a terminal window titled "XAMPP for Windows". The terminal shows the following text: "Setting environment for using XAMPP for Windows.", "Mingo@DESKTOP-MIT870L c:\xampp", "# cd C:\Users\Mingo\Desktop\tapecart-browser-1.3\build", "Mingo@DESKTOP-MIT870L C:\Users\Mingo\Desktop\tapecart-browser-1.3\build", "#".

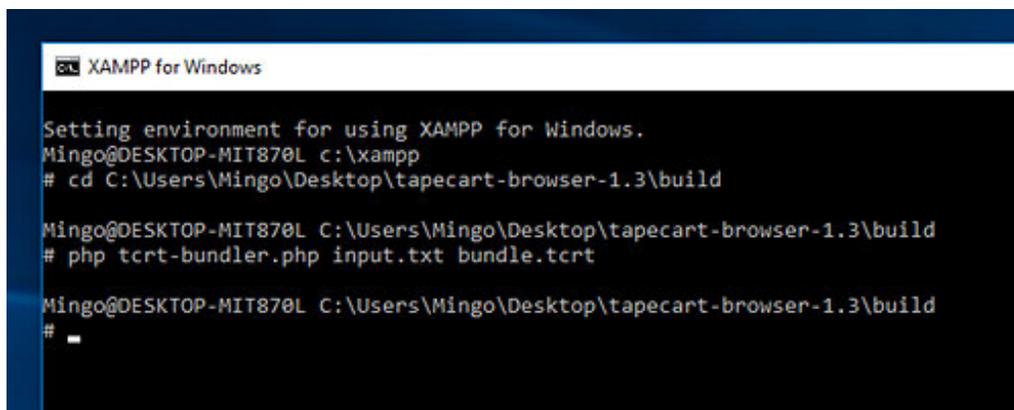
```
Setting environment for using XAMPP for Windows.
Mingo@DESKTOP-MIT870L c:\xampp
# cd C:\Users\Mingo\Desktop\tapecart-browser-1.3\build

Mingo@DESKTOP-MIT870L C:\Users\Mingo\Desktop\tapecart-browser-1.3\build
#
```

Click on the image to enlarge

Now we enter the following command which initiates the creation of the TCRT-Date.

`php tcrt-bundler.php input.txt bundle.tcrt`

A screenshot of a terminal window titled "XAMPP for Windows". The terminal shows the following text: "Setting environment for using XAMPP for Windows.", "Mingo@DESKTOP-MIT870L c:\xampp", "# cd C:\Users\Mingo\Desktop\tapecart-browser-1.3\build", "Mingo@DESKTOP-MIT870L C:\Users\Mingo\Desktop\tapecart-browser-1.3\build", "# php tcrt-bundler.php input.txt bundle.tcrt", "Mingo@DESKTOP-MIT870L C:\Users\Mingo\Desktop\tapecart-browser-1.3\build", "#".

```
Setting environment for using XAMPP for Windows.
Mingo@DESKTOP-MIT870L c:\xampp
# cd C:\Users\Mingo\Desktop\tapecart-browser-1.3\build

Mingo@DESKTOP-MIT870L C:\Users\Mingo\Desktop\tapecart-browser-1.3\build
# php tcrt-bundler.php input.txt bundle.tcrt

Mingo@DESKTOP-MIT870L C:\Users\Mingo\Desktop\tapecart-browser-1.3\build
#
```

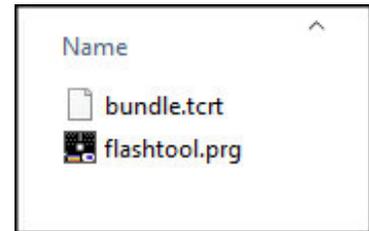
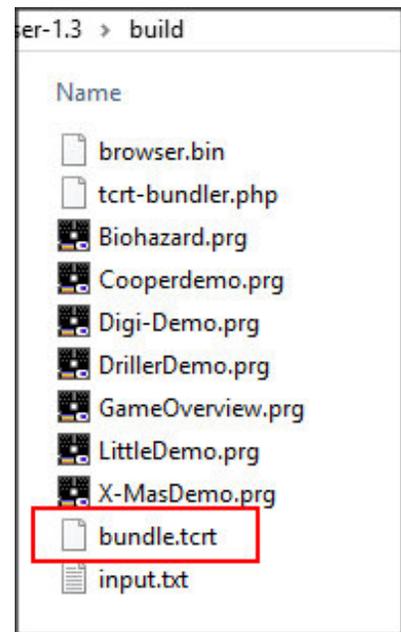
Click on the image to enlarge

If no error message is displayed then everything should have worked. In the directory in which the script "tcrt-bundler.php" is located, you should now find the newly created file "bundle.tcrt".

This file is copied to the SD card of the SD2IEC / 1541U. We must not forget the Flashtool which we also copy on the map. This can be found on the github page github.com/ikorb/tapecart . The SD card should now contain the two files "bundle.tcrt" and "Flashtool.prg".

On the C64: Load the Flashtool with the command

```
LOAD"FLASHTOOL.PRG",8,1
RUN
```



Only if the TCRT file is not located on the drive with the address 8:

In this case, we first have to specify on which drive the TCRT file that we want to upload is located. To do this, we go to the "Drive Menu ..." or menu item 7 of the flash tool and then

we select item 1 "change current drive". Here we now enter the device address of the drive on which the data is located. "00" stands for REU, if such an extension is used. The selected drive remains stored even if the computer is turned off.

```
tapecart-tool v1.2 by Ingo Korb
-----
Change current device
Device number: [08]

Enter 0 to select REU

-----|Device: 08|-----
Current tapecart status:
Data start      $0000
Data length     $f800
Call address    $080d
Display name    [prior art ]
Loader checksum $4979 (default)
```

Now we select the item "write TCRT file to cart" from the menu and enter the name of the TCRT file with extension: bundle.tcrt

After confirming the Enter key, the upload starts. This takes over 90 minutes at 2Mb.

```
tapecart-tool v1.2 by Ingo Korb
-----
Write TCRT to cart
File name: [bundle.tcrt ]

Writing page 134 [$008600]

-----|Device: 08|-----
Current tapecart status:
Data start      $0000
Data length     $c7c2
Call address    $07f7
Display name    [christmas.prg ]
Loader checksum $4979 (default)
```

If the saving process was carried out, then only the browser must be loaded and already the programs selected by us can be used. The browser is loaded with the command LOAD.



The slideshow that is on the tape cart ex works will be overwritten as soon as data is written to the memory. Fortunately, the slideshow can be uploaded again at any time. We find them on the csdb.dk page in the form of a TCRT image that we already know. We can copy this to the tape cart as described above.

Write datafile to cart

Another possibility to save data is the function "Write datafile to cart". It hides in the menu under "Advanced Options ...". This allows individual files to be copied to a specific address on the tape cart memory. This has the advantage that a program can be saved / replaced without having to re-upload the complete TCRT image. However, the exact address must be specified.

```
tapecart-tool v1.2 by Ingo Korb
-----
Write data file
Flash offset: [$001000]
File name    : [browser.bin] ]

-----|Device: 08|-----
Current tapecart status:
Data start   $0000
Data length  $2d35
Call address $2800
Display name [tapecart browser]
Loader checksum $4979 (default)
```

For example, if you want to replace the browser, the address \$ 001000 must be specified.

Dump Cart to TCRT file

As the name implies, the contents of the tape cartridge's memory are copied to a file and stored on the D2IEC / 1541U / REU. The image disappears until the dump has been performed.

