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SOFTWARE PROJECT

Links

The Web Browser

User documentation

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Welcome

Welcome to **Links**, the most powerful web browser for professional work with WWW. The **Links** web browser combines ease of use of the user interafcace with crystal clear picture of exactly rendered video output and also with power and reliability of HTTP requester and HTML parser written without compromisses manually in C.

New user interface unique for **Links** web browser makes work easier and faster for people seriously interested in routine, fast, accurate and secure work with WWW. New functions like asynchronous DNS lookup or possibility of smooth enlarging images on page ease up quick movement in WWW space in an unprecedented way. Orienting in thumbnails on image search engines is made easier using this image enlargement technology. Simple and thorough system of interactive menus allows easy and unambiguous configuration of the browser with maximum possible security for sensitive data.

About this documentation

You will find a complete guide for using the **Links** web browser:

- installation instructions
- running and configuration instructions
- description of control

Contents

1. Introduction into Links web browser

Links web browser is conceived to fullfill complicated demans of today's low-level IT specialists.

1.1 Ease of control, productivity and compatibility

Links web browser posesses easily controllable powerful internal mechanisms for DNS lookup, HTTP requests, HTML parsing, decoding of image data streams, execution of Javascript and rendering of quality videographics. The system ensures very high and accurate graphics power suitable even for demanding applications, like presentation of medical data with high dynamics of grey scale (X-ray images) in projection halls or preview in proffessional photography archives and presentation volumes from primary image data carries in 48-bit colour depth corresponding to use of professional drum scanners. This property is at the same time allowed on common displays or projectors with standard colour depth with only 24 bits per pixel, even under unfavourable gamma conditions in the display chain. All web applications working with image material may be exploited in a way that ensures currently unusual level of quality of graphics output and accomodation to particular user's working environment. Information loss can be prevented now even with high processing speed and exploiting dynamics of wide possibilities of the WWW interface.

User interface in text mode is backward compatible with user control of Lynx web browser, therefore users that have been using this browser until now can withhout problems move on to **Links** web browser.

1.2 Font ergonomy and screen area employment

Resampling subsystem of **Links** presents the typeface at unprecedented legibility even at extremely high numbers of lines per screen. Thanks to it the employment of screen area is at it's maximum at physical boundariy of the particular monitor available to the user. Ergonomy of the work and reading reliability is increased. Working comfort is stabilized. Work output is maximized during specialized researches in WWW information space. A technology of adaptive convolution preemphasis of spatial spectrum of text portion of the screen image ensures additional enlargement of these benefits in area of small interline pixel pitches.

On the other hand the used resampling technology brings finer letter contours at high interline pitches, reduction of the necessary amount of font data and unusually flexible possibility of unicode glyph set extension by national alphabet or arbitrary pictorial symbols, independently from source platform of glyph image data. Moreover insertion of a glyph is possible without prior vectorisation directly from physical image carriers directly after performing rasterization on image acquisition device.

1.3 Low-profile footprint in file system

The used unique technology „Low-profile footprint in file system“ (LPFFS) allows immediate and easy integration of all browser components at the same time into the existing file hierarchy of the operating system. Thanks to the LPFFS technology, the browser presents itself after installation by only a single executable file into which all components necessary for browser runtime are already integrated. Thanks to the LPFFS technology problems during installation and possible uninstallation are prevented. The possibility of immediate realization of conflict-free installation of the browser is fostered in an existing file system while keeping compatibility with the file system hierarchy standard (FHS) even on very large and complicated systems of remote file tree sharing over a network.

1.4 Accuracy of graphics element presentation

Image, graphics and colour elements of HTML pages are processed on a highly standardized level, which ensures maximum reproducibility of the output on various imaging platforms and during presentation of diverse image formats. The video and typesetting subsystems complies to standards RFC 1867, RFC 1942, RFC 1945, RFC 2068, RFC 2109, RFC 959, RFC 1738, RFC 1808, RFC 1288, ITU T.81, CCIR Recommendation 601, JFIF 1.02, ISO DIS 10918-1, RFC 2083, IEC 61966-2-1, ISO 9241.

1.5 Important features

- Portability on Linux, BSD, Unices in general, OS/2, BeOS, AtheOS, FreeMint, Cygwin (pod Windows).
- **Links** displays in graphics mode (mouse is necessary) on X-Window system (UN*X, Cygwin), SVGAlib, linux framebuffer, OS/2 Pmshell and Atheos GUI.
- Links displays in text mode (mouse is optional) on UN*X console, ssh/telnet virtual terminal, VT100 terminal, xterm and basically any other text terminal. Mouse is supported under GPM, xterm and OS/2. **Links** supports colors on terminal.
- Easy and fast user control using pull-down menus in text as well as in graphics mode, in 25 languages.
- HTML 4.0 support (without CSS).
- HTTP 1.2 as well as HTTP 1.0 support
- Tables, frames in graphics as well as in text mode, builtin image display in graphics mode.
- Builtin display of image formats GIF, JPEG, PNG, XBM and TIFF in graphics mode.
- Anti-advert filter on animated GIFs.
- Javascript support in graphics as well as in text mode with full control of the user over the script run.
- Bookmarks.
- Downloading files in background.
- Automatic reestablishment when TCP connection falls apart.
- Display of pages during download.
- Keepalive connection (keeping the connection for some time after downloading document).
- Asynchronous (on background) DNS lookup (looking up server and connection establishment is being performed on background).
- Cache for formatted documents — **Links** is the only among browsers, that has a cache for formatted document. Thanks to this cache a page is immediately displayed after return to it and the user doesn't have to lenghtily wait on page formatting.
- Possibility to set up external programs for all MIME types, possibility to select the program during every opening of a file if more programs are set for a single file type.
- Quality 48-bit gamma correction, oversampling and Floyd-Steinberg dithering in all colour depths.
- Oversampling (antialiasing) of letters in practically unlimited range of interline

pitches, optimization of letters and images for LCD display.

- Fonts are compiled-in directly in the executable file, so that Links doesn't rely on fonts installed in the system.
- Possibility to set up letter size in menu as well as in the page and enlarging of images by the user.
- User-settable gamms (red, green, blue) of the monitor and a gamma for workplace lighting correction. Accurate calibration of both monitor and **Links** using calibration pattern.
- Automatic correction of pixel aspect ratio for modes like
- Automatická korekce nečtvercovosti pixelů pro módy jako 640×200, 640×400, 320×200 with user-settable additional correction.
- Support for one-wheel (vertical scroll), two-wheel (vertical and horizontal scroll) mose and smooth canvas scroll by grabbing the canvas by mouse (without necessity to have a mouse with a wheel).
- Easy installation, the browser is only one executable file.

1.6 Supported platforms

Links can be run on the following platforms. On all mentioned platforms **Links** works in text mode and in graphics mode under X-Window system. With some operating systems, additional supported graphics systems are mentioned in parentheses.

- AIX
- AtheOS (AtheOS graphics environment)
- BeOS
- Cygwin under Windows
- FreeBSD
- FreeMint
- HPUX
- Irix
- Linux (SVGAlib, framebuffer)
- MacOS X
- NetBSD
- OpenBSD
- OS/2 (Pmshell)
- Solaris
- SunOS
- Tru64

2. Installation

Links is shipped in a form of source code archive `links-2.0.tar.gz`. Source texts are freely accessible on web. For the installation we suppose that you have the file `links-2.0.tar.gz` in current diretory.

2.1 Installation requirements

For installation and running **Links** in text mode, the following basic programs are necessary:

- one of aforementioned supported operating systems
- archiving program `tar` and compression program `gzip` or `bzip2`
- C language compiler with header files and `libc` library conforming to the POSIX norm
- program `make`

For operation in graphics mode the following libraries are necessary in addition:

- graphic system `X-Window`, `SVGAlib`, `AtheOS`, or `Pmshell`
- image support libraries `libpng`, `libtiff`, and `libjpeg`

If `libtiff` or `libjpeg` is not installed on your system, the browser will compile without TIFF or JPEG image support, rspectively. **LIbrary `libpng` is necessary for operation of the browser**, as internal fonts are stored in PNG format.

The following libraries are optional:

- `SSL` library — for SSL protocol support
- `libgpm` library — for work with mouse on text console. We recommend version 1.19 and higher (especially on framebuffer).

Warning!

Development versions are necessary of these libraries as well (also sometimes marked as „devel"). They contain header files necessary for compilation. If your system is installed from packages, check that you have also packages with „devel" in their name installed for these libraries.

2.2 Compilation and installation

1) Unpack installation archive `links-2.0.tar.gz`, a directory named `links-2.0` will be created.

```
gzip -d links-2.0.tar.gz
tar -xvf links-2.0.tar
```

2) Alternatively, if you don't have program `gzip`, but only program `bzip2`, you can unpack the archive `links-2.0.tar.bz2` with these command:

```
bzip2 -d links-2.0.tar.bz2
tar -xvf links-2.0.tar
```

3) Enter the created directory `links-2.0`

```
cd links-2.0
```

4) Run the configuration script „./configure", it will automatically detect what libraries you have and switch on corresponding functions of the browser according to that

```
./configure --enable-graphics --enable-javascript
```

If you want to compile the browser as a text-only version (without graphics support), write only

```
./configure --enable-javascript
```

The configure program should find all necessary libraries on your system. In a rare case it can happen that some libraries are not foundalthough they are installed (for example when you have an atypical installation). In such a case you have no other option than entering the library path for the unfound libraries manually using switches:

- --with-ssl=<path>, where <path> is the path to SSL library (typically is in v /usr/local/ssl or /usr/lib/ssl)
- --x-libraries=<path>, where <path> is the path to k X-Window libraries (typically /usr/X11/lib)
- --x-includes=<path>, where <path> is path to X-Window header files (typically /usr/X11/include)

If you do not know path to some library, consult with your system administrator.

If you want to set up configuration script parameters in a more detailed way, using the following command you will learn all the possible parameters:

```
./configure --help
```

If you need to set up special paths to header files and libraries before running the configure script, set up environment variables CFLAGS, CPPFLAGS, LDFLAGS. This is only for advanced users, if you aren't sure, ask your system administrator.

Therefore if you want for example look for header files in the path /usr/ext/include and libraries in path /usr/ext/lib, before running the configure script, write for example (in bash):

```
export
CFLAGS="$CFLAGS -I/usr/ext/include" export CPPFLAGS="$CFLAGS
-I/usr/ext/include" export LDFLAGS="$LDFLAGS -L/usr/ext/lib"
```

5) Start compilation by command

```
make
```

6) After the compilation finishes, a single binary file named links will be created. No mor files are necessary for the operation of the browser. Therefore you can easily copy the program between computers.
7) Copy the **Links** into a directory where you install executable files, best into your $PATH (path, where executable files are being searched for) — for example, if you are an administrator:

```
cp ./links /usr/bin/
```

If you are installing the browser as an user, copy the file links into your home directory, into a directory where you store executable files. For example:

```
cp ./links ~/bin/
```

8) If you are using X-Window system and want to install Links icon into your window manager, you will find it in the file graphics/links.xpm. The icon has size 48×48 pixels.
9) If you don't have a permanent connection to the Internet, copy the whole subdirectory doc/ into some suitable place, for example /usr/share/, /usr/local/share/, /usr/doc/, /usr/share/doc/, ..., or into your home directory. The most important is the directory doc/links_cal/, which contains a procedure for screen picture calibration (calibration.html in English and kalibrace.html in Czech).
10) Remove the archive and directories with source files:

```
cd ..
rm -r links-2.0.tar links-2.0
```

At this moment the installation is complete. Now it is necessary to perform calibration. If your browser is compiled for text mode only, skip the calibration procedure and start reading directly the chapter about running and control of the program.

2.3 Browser calibration

Run

```
links -g doc/calibration.html
```

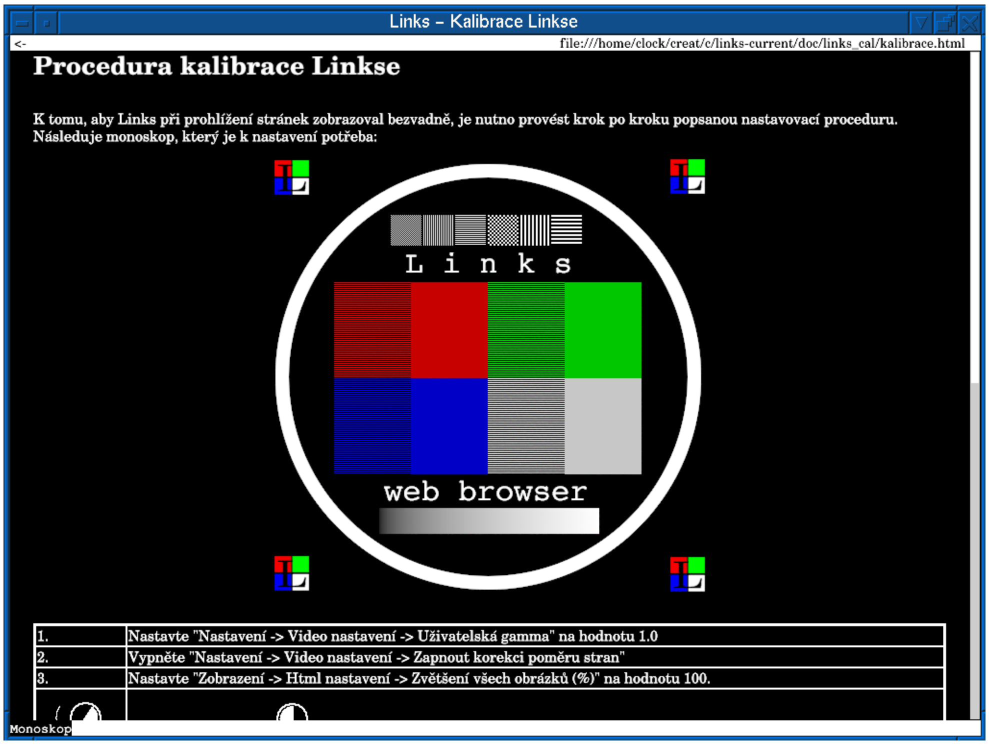
or possibly write a different path to the file nebo případně napište jinou cestu k souboru `calibration.html` (where you copied the documentation).

If you are connected to the Interet, you can display the calibration directly from the Internet. Write on the command line:

```
links -g
```

After seeing the welcome dialogue, close it by pressing `ENTER`, then press the key `ESC` or click left mouse button on the bar on the top edge of the browser window. Then using the keys left and right move on to „Help“ and press `ENTER`. Possibly click by mouse on „Help“. Now using keys up and down select „Calibration“ and press `ENTER` or directly click on „Calibration“.

On the screen you should see this picture:



Now proceed exactly step by step according to the instructions on your screen.

> **Warning!**
>
> Image quality without performing calibration is not guaranteed.

3. Running and controlling the program

In this chapter you can read basic informations about controlling and running the **Links** browser. In the following chapters you can find a detailed description of individual functions and browser setup.

3.1 Running the browser

3.1.1 Running in text mode

The browser is being run simply. Enter the directory with the binary file `links` and type on the command line:

```
./links
```

If the binary file is in your path, it suffices to type on the commandline:

```
links
```

You can enter switches after the `links` command on the command line. These switches control run of the browser. The switches are written in the form `-switch`, where „switch“ is the name of the switch. The switches are delimited from the program name and from other switches by a space. Behind the switches you can (but do not have to) enter URL of the page you want to fetch, or a path to HTML file on local filesystem (if you want to display a page saved on your local filesystem). Separate the URL by a space, too.

Example:

```
links www.altavista.com
```

Some switches moreover demand a value, which you have to write after the switch and again separate from the switch by a space. In the followin table you can read about the most often used switches and their meaning.

Switch	**Meaning**
`-g`	The browser will run in graphics mode
`-mode`	Serves setting of graphics driver mode (see running in graphics mode).
`-driver`	Specifies a graphics system that should be used. If you do not use the switch, graphics system will be autodetected.
`-help`	Prints out a summary of switches and keyboard control.
`-version`	Displays version number of the program.

3.1.2 Running in graphics mode

To enter the graphics mode you have to use the switch `-g`. Type on the commandline:

```
links -g
```

Links will try to autodetect the graphic systems which you have installed on your computer. If it finds one, it will switch into graphics mode. Graphics systems will be detected in this sequence: `pmshell`, `x`, `svgalib`, `atheos`. If you want to choose the graphics system manually, use the switch `-driver` with one of the arguments: `pmshell`, `x` nebo `svgalib`.

For example:

```
links -g -driver svgalib
```

If you are using the X-Window system and detection fails, you have to correctly set up the environment variable prostředí `DISPLAY` to point to your display.

`-mode` switch serves the purpose to pass parameters to the graphics driver. For SVGAlib system it is used to determine screen resolution. For X-Window system it selected the display.

3.1.3 SVGAlib graphics system

Using the -mode switch you set up graphics resolution. To learn all possible resolutions write:

```
links -g -mode help
```

Graphics resolution is being delimited in this format:

```
<width>x<height>x<colour depth>
```

where <width> a <height> are dimensions of the screen in pixels and <colour depth> determines number of colours. Possible colour depths are: 16, 256, 32K, 64K, 16M, 16M32.

Example of graphics modes:

```
1024x768x16M
800x600x64K
320x200x16
1280x1024x32K
1024x768x16M32
640x480x256
```

If you want for example to run **Links** in graphics resolution 1024×768 and 16 milllions colours, write:

```
links -g -mode 1024x768x16M
```

3.1.4 X-Window graphics system

To run the program you need a colour display and minimum colour depth of 4 bits (16 colours) with possibility to set up private palette. Grayscale modes are not supported, as well as so called „StaticColor“ modes which do not allow setting up private colour palette. If your display has more colour depths, the browser will choose the greatest one. If you have a display with only paletted mode, the program will create it's own colour paletter, which will be set up on activation of the window and reset back after deactivation.

In the X-Window system the switch -mode sets display on which the output from **Links** web browser should be displayed. The display is written down in format

```
<computer address>:<display
number>.<screen number>
```

In majority of cases the <display number> as well as <screen number> is zero. If it is a local computer, the <computer address> is an empty string. If you do not select display by this switch, environment variable DISPLAY will be read. If it is not set, the browser will display on the display :0.0.

Examples, what the commandline may look like during running under the X-Window system:

```
links -g -mode delta.ether.net:0.0
links -g -driver x -mode localhost:0.0
links -g -driver x -mode :0.0
links -g -mode micron:1.0
```

In the first example the output of the browser will be displayed on remote computer delta.ether.net. In the second case you explicitly say that X-Window graphics driver should be used and the output should be displayed on the computer you run the browser on. Third case is equivalent to second one. In the last example the output will be displayed on computer micron in local network, on display number 1.

3.1.5 Framebuffer graphics system

Links runs on framebuffer graphics system on Linux operating system. There is a limitation that only systems with linear memory mapping are supported. Another limitation is on the mouse driver, which is implemented using the `gpm` library, which is the only portable way of implementation. As the `gpm` library is created for text mode and graphics mode has much higher resolution, the mouse would be too slow. Therefore the mouse pointer doesn't move smoothly but in steps of several pixels. In exceptional cases it is possible that a particular place on the screen will not be possible to click to. For this you can use the keys F5, F6, F7, and F8 for fine movements of the mouse pointer.

This is not a bug of **Links**, but of the `gpm` library, which is character oriented. As there is not any other option how to read mouse on framebuffer, this is the only known way, how to read the mouse. If you do not like this solution, please write to the authors of `gpm` to add graphics support into `gpm`.

If you have administrator rights, it is possible to change source texts of `gpm` for the mouse pointer to move smoothly, and then recompile `gpm`. Patch `gpm` with patch included with **Links**, which you find in the directory with the program, it is named `PATCH-gpm-1.20.0-smooth-cursor`. The patch has been created for source codes of `gpm` version 1.20.0. It will probably work for other versions of `gpm` too.

3.2 Configuration file

Links After first run, directory `.links` will be created. It will be created in your home directory determined from system variable `$HOME` (if it doesn't exist, then in the directory where binary file `links` is stored). This created directory will be used for storing configuration files, bookmarks, history and more system information.

Warning!

Do not erase the configuration directory. Otherwise you will lose all your browser setting and bookmarks.

3.3 Basic terms

First we will clarify some terms that will later occur in the text:

- **myš:** A positioning device, typically of oval shape, connected with a cable to the computer usually is on the desk next to the keyboard. Some computers do not have a mouse, but they are rare today.

  The mouse in basic version has two or three buttons on it. The buttons are called **left**, **right**, and **middle**. The left button is the one closest to the left edge of the mouse, the right one is the one closest to the right edge of the mouse. The middle button is present only on three-button mouses and resides between left and right button.

  The mouse is controlled this way: using palm of hand (right-handed people will use right palm and left-handed people left palm) the mouse is moved around over the underlying surface. Buttons are pressed by finger (best by pointing finger, middle finger and ring finger).

  Some mouses have instead of middle button a scrolling wheel (we will talk about scrolling later). If you press the wheel, it works as the middle button. Rolling the wheel you scroll up and down. Mouses with two wheels occur too — instead of middle button and instead of the right button. The wheel present in place of middle button (1. wheel) is used for vertical scrolling. The wheel on the right button (2. wheel) is used for scrolling in horizontal direction.

- **kurzor:** Arrow or highlighted small rectangle that moves around the screen with the mouse. Is for pointing on the screen.

  Sometimes the term cursor also denotes a highlighted rectangle that can be moved over the text. For example in the menu the cursor highlights the currently selected entry.

- **placing cursor over something:** Means moving the cursor so that it points to given place on the screen.

- **clicking mouse on something:** Means placing cursor over given place on screen, pressing and releasing mouse button. Usually it will be said, which button should be clicked, therefore it will be for example said „click right button on OK button" which means placing cursor over the button with label „OK" and pressing and releasing the right button. If it will not be stated which button should be clicked, the left button is meant.

  Attention, at some programs, pressing and releasing in succession two times is meant by clicking. In the **Links** program, the button is being pressed and released only once. If you press the button twice, it will be considered two clicks.

- **arrows / cursor arrows / cursor keys:** This is not a popular sport performed in pubs, but a quadruple of keys in bottom right part of the keyboard. These keys are significant by the fact that arrows are printed on them: up, down, left, and right. These arrows are used to control the cursor (in the sense of highlighted rectangle).

- **scrolling text:** Means moving text around the screen up / down or left / right. Is being used namely when the whole text doesn't fit the screen and we have to move the text to display the text that we don't see (is like behind the corner of the screen).

  The most natural vision of this is that we have a page of text (the text ve view) and a rectangular magnifying glass through which we look at the text (the magnifying glass substitutes the screen). And because the magnifying glass doesn't cover the whole page, then we have to shift it – scroll. We say for example that we scroll right which in our case means that we move the magnifying glass rightwards.

- **scrollbar:** Is a thing in shape of bar, on which a rectangle slides. It occurs on the screen on the right side of the text or down under the text and serves scrolling purpose. Position of the rectangle on the bar determines position in the text — position of our imaginary magnifying glass on the page.

  If we want to scrool the text for example down, we move the mouse on the rectangle on vertical scrollbar, hold the left mouse button and move the mouse down. This way the rectangle on scrollbar moves down and the text scrolls down. If we want to stop scrolling, then we simply stop holding the left button.

  If we are using mouse with scrolling wheel, turning the wheel we scroll in current frame.

- **dialog (dialog window):** Is a window on screen, in which text is being displayed or into which text can be entered. Usually contains also some buttons, for example „OK", „Cancel", „Yes", „No" and similar.

- **main menu:** Is a horizontal bar on upper edge of the screen, serves for selectiong individual groups of browser functions („Setup", „View", „File", and so on). After selecting main menu entry a **pull-down menu** containing individuall functions from the group will be displayed under the selected entry.

- **URL:** Abbreviation for „Uniform Resource Locator", which means address of a document on network. URL has it's basic form: (some parts are not mandatory)

`protocol://server-address/path-to-document-on-server`

Using URL, HTTP document (web page) can be addressed. Also FTP directories can be addressed as well as files on local disk.

Examples of URL:

```
http://www.google.com/
www.praha-mesto.cz
http://artax.karlin.mff.cuni.cz/~mikulas/links/index.cgi
ftp://ftp.gnu.org/ /usr/doc/HOWTO/Vim-HOWTO.txt
```

3.4 After running

After running web browser window is displayed. If you entered URL on commandline, the requested page will be displayed directly. Otherwise a gray area will be displayed. On the bottom endge of the window so called **status line** is visible, where informations about passage of the connection are displayed. Link address is also displayed here (if you point to a link with the cursor) as well as image title and similar things. In the upper left corner there is an arrow that servers for movement into history.

3.5 Dialogs for entering text

Text entry dialogs are often used within **Links**For example entering URL, during search, and so on. Therefore we will describe here how these dialogs are to be controlled.

The dialogue contains a field for entering text and buttons `OK` and `Zrušit` . Text can be normally written into the text field, keys `BACKSPACE` a `DELETE` delete text, keys left and right move cursor around the text. Keys `CTRL` + `x` erases the whole line and puts it into the clipboard (OS/2 only). Keys `CTRL` + `v` insert clipboard contents (again only on OS/2). `CTRL` + `u` erases text from the cursor to the beginning of the line.

Using up/down cursor keys history of previously entered values can be browsed. `CTRL` + `w` key combination activates text autocompletion function. If you want to enter a text that you have already previously entered, just several leading characters have to be typed and by pressing this key combination a possible continuation will be filled in or a dialogue with possibilities is presented if there are more thann one possibility.

By clicking on the key `OK` you confirm the entered text. By clicking on `Cancel` you cancel entering the text.

3.6 Navigation around the document

Now we are going to describe how to move around the page, what is being displayed on the page, how to click on links and how to scroll the displayed page.

3.6.1 Virtual consoles

Links has a capability to create so called virtual consoles on graphics systems where new browser windows cannot be created. It's about that after running the browser you have a possibility of making up to 10 virtual consoles which correspond to browser windows on a windowing system. You can switch between virtual consoles using key combinations `ALT` + `1` , `ALT` + `2` to `ALT` + `0` . If you create a new browser window (for example by function „New window“), a new virtual console will be allocated with lowest number (after running the browser you are therefore on virtual console number 1) and required page will be displayed on it. If you close window, the corresponding virtual console will disappear and the remaining consoles will remain as they are - they won't be renumbered as one could think.

This technology allows users to parallel viewing of more pages even on systems where windows can't be created.

3.6.2 Frames and scolling

As is known, HTML pages can contain frames. It is possible to switch between individual frames in text mode by key `TAB` and in graphics mode clicking inside the frame.

Scrolling a page is simple too. In graphics mode you can scroll using scrollbar situated on the right side of the frame. You can also scroll by cursor arrows. Keys cudlPAGE UP and `PAGE DOWN` serve purpose of shifting to previous or next page of the document. You can scroll by one page also by pressing space bar. Keys `HOME` and `END` move to beginning or end of document, respectively. If you have a mouse with wheel, you can scroll in vertical direction in graphics mode using this wheel. If you have a mouse with two wheels, the first wheel (usually in place of middle button) serves vertical scrolling and second wheel (usually in right button) serves horizontal scroll.

You can scroll at any time using the middle button: hold the middle button down and move the mouse as if you wanted to grab and slide paper page by hand. This way shifting in all direction works — both horizontally and vertically. So if you hold middle button and move mouse to the right, the view is being moved towards left edge of the whole page. By mouse you therefore move to the other side than by scrollbar.

The same way you can move the page using right mouse button but only when you do not hit an image, link, form element and similar. If you hit it with right button, a menu of actions appears that can be performed with the image, link, or element.

In text mode the keys `PAGE UP`, `PAGE DOWN`, `HOME`, `END` and space work analogically. As cursor arrows are used for movement over the links, the page is to be moved to the left and right by keys `[` and `]`, in up/down direction by keys `INSERT` and `DELETE` (or by `CTRL` + `P` a `CTRL` + `n`.

If a page contains more frames, the described routine works in the current frame.

3.6.3 Links and status line

Links are selected in graphics mode simply by clicking the link. In text mode you have to first select the link by up/down arrows. The current (selected) link is denoted by inverted background. If you want to follow the link, press right arrow key or the key `ENTER`. Links are written in blue, unless the page defines a different colour for the links.

After clicking on a link, **Links** first starts to look up a server (sends a DNS query), after that it starts establishing a connection with the remote server. After the connection is established, a request for page is transmitted and then only waiting for the reply is performed. The whole course of the communication is displayed in status line on the bottom of the screen. As soon as the whole page is downloaded, „OK“ will be displayed. If the page hasn't been yet downloaded, you have a possibility to terminate establishment of the connection by the „back“ function (by key `Z` or in text mode by left arrow key, also by clicking the left arrow in top left corner).

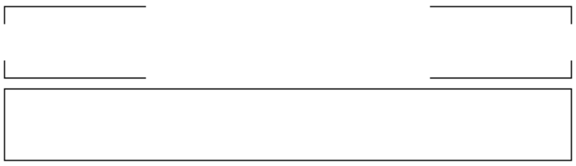
Adter loading the page, the status line show informations about links, images and other elements of page. If you move over a link, address of link target is displayed (you can easily determine if something is a link by this method). If you move over an image, it's title (alt attribute or URL of the image in case it doesn't have an alt) is displayed. After moving over a form element (text area, checkbox, radio button etc.) an information about that particular form element is displayed (for example it's name, value, address where the form will be sent to, . . .).

If javascript is running on some page, it can also write into the status line. In this case the status line doesn't show these informations but the text that javascript set.

What a status line at bottom edge of the screen looks like.

During loading the page currently not yet loaded or decoded images are displayed as a frame with size of the image (as specified in HTML). After downloading and decoding the image, the image will be displayed instead of this frame. If an error occurs due to which the image cannot be downloaded, the image is damaged or it can't be displayed for another reason, a broken frame will be shown instead of the image. A frame has dimensions of the image (if dimensions are known). In case they are not known, the frame has basic dimensions 32×32 pixels.

Upper side of the image shows what a broken image looks like. In the lower part you see how a yet undownloaded image is shown.



3.6.4 Objects on the page

Links partially doesn't support certain HTML tags, which can occur on a page, but as some can contain important information, **Links** displays such tags as links. Actually they are tags:

- **EMBED:** This tag can insert some additional documents into the page (for example flash image, text and similar). **Links** knows how to insert only image by this tag. If an image is inserted into the page using the `EMBED` tag, it will be displayed as an ordinary image. If a different document type is inserted using `EMBED` tag, a button `EMBED` will be displayed at corresponding place in the page. After clicking on this button, the embedded document will be displayed separately. You cam hook up for example external flash animation player this way and after clicking on the button `EMBED` with flash animation the program displaying flash animations will be run. For details on setting external viewer programs see functions „Associations").
- **OBJECT:** Behaves the same way as `EMBED`. The difference is only in that an image cannot be inserted this way, therefore a button `OBJ` will always be created. This button has a similar function as `EMBED` button.
- **IFrame:** Inserted frame. As **Links** doesn't support inserted frames, a link `IFrame` will be displayed instead of inserted frame. After clicking, the inserted frame will appear.

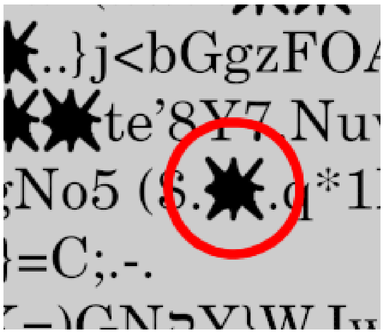
- **Link:** This tag serves for creating a link in the document header. At it's place (at the beginning of the page) a link `Links` will be displayed. Again it is possible to click on this link, after clicking you reach the target of the link.

In text mode you can also encounter button `USEMAP` or `IMAP` , which are displayed instead of image clickmap. After clicking on the button a list of links (which are in graphics mode under individual images), from which you can choose the link you want to follow.

On some page you can encounter a link `Refresh` linking to a different page. „Refresh“ is redirection to a different page, which is being performed automatically in some cases. **Links** doesn't perform redirection automatically, because it's utmost uncomfortable for the users to get before the page with the redirection, because after pressing „Go back“ she gets on the page with the redirect and this will automatically redirect him forward again. To avoid this, redirection is displayed as „Refresh“ in **Links**. After clicking the link, redirection to the target page will be performed.

If some characters occurs at web page which **Links** doesn't have in it's font, a character „blotch“ will be displayed instead of them. If there are too many blotches in the page and you think that the page should display correctly, try in „HTML options“ menu in „View“ to change the value of „Default codepage“. It is possible that the server doesn't send information about code page and you just have a different encoding set as default. It is also possible that the server is sending a wrong information about code page of the document. For this case you can in the same menu tick the entry „Ignore charset info sent by the server“.

Instead of missing character, a blotch symbol is displayed:



If foreground and background colours have too similar luminances, then the foreground colour will be selected as much contrasting to the background colour as possible. This function is builtin in **Links** to increase legibility of text on pages that have unsuitably set colours in a way that it makes the text difficult to read for the user.

> **Warning!**
>
> On some pages therefore it can happen that the text colour will not be displayed in a way the document authors intended, but it will be displayed different way — so that the text is as legible as possible. This is not a bug of the browser, this function is intentional. If the colour was displayed in the way that the authors intented, the text would be very badly legible for the user.

3.7 Menu

The whole **Links** program is being controlled using interactive menus, the control is therefore very easy and intuitive. All functions can be summoned from the main menu, some can be on top of this summoned by so called hot key.

You can invoke the main menu by pressing the key `ESC` or by clicking the mouse on bar on the top edge of the window. You can close the menu by repeated pressing of `ESC` or by clicking under the bar on top edge of the window. You select individual entried in menu either by direct clicking of mouse on the required entry, or by cursor keys — in main menu left and right, in pulldown menus by up and down keys. `ENTER` or space bar serve for selection of required entry.

Some entried of the menu have one character of the name highlighted (by inverse background). If you press this letter in menu, a direct choice of this entry will be performed, which is usually faster than moving on the entry with cursor or mouse.

To the right of some entries a so called hot key can be mentioned. If you press this hot key anywhere in the browser, the corresponding function will be directly called, which is again faster than looking for the function in menu. You don't have to remember hot keys — all available functions can be reached through the menu.

3.8 Dialogue windows

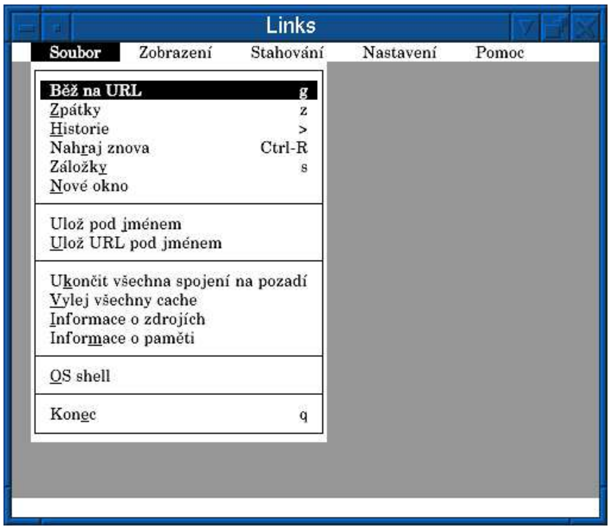
Dialogues can be controlled very similarly as menus: by up and down arrows you select individual entries of the dialogue, by spacebar you activate the selected entry (a button is pressed, a tickbox is ticked and similar). Or you can of course use mouse. DIalogue is canceled by ESC key. This means that it will be closed and all changes (entered text, ticked up tick box and similar), which you did, will be forgotten. On the other by key `ENTER` the dialogue will close and all changes will be accepter.

Dialogue windows can also contain fields for entering text. If you want to enter text into such a field, first you have to activate the field (either by clicking it with mouse or selecting by cursor keys) — there will a cursor appear in the field. After this you can normally insert text, numbers and similar. Using keys left / right you move around the text, by keys `BACKSPACE` and `DELETE` you delete the text. By keys up / down you leave the text field and therefore end editation.

4. Description of functions

Now we are going to show all functions of the browser in detail, as they are mentioned in the menu.

4.1 File Menu



In the menu `File` find function working with URL: change of URL, history, bookmarks, then functions for downloading document, system information, operating system commandline and ending the browser.

4.1.1 Goto URL

This function serves loading a new page. This function can be summoned by key `g`. After summoning this function a dialogue will appear on the screen into which you enter URL of the required page. After entering address the page will immediately begin to be downloaded. If you press the key `g` with shift, address of currently viewed page will be pre-filled in the URL dialogue.

4.1.2 Go back

Back function serves purpose of displaying the previous page. It is being invoked by key `z` or by clicking on the back arrow un upper left corner of the screen (as can be seen in the following picture). If for example you have displayed page „A“, then you go to another page (no matter if by clicking a link, or by entering different URL) and then you want to go back to page „A“, then you use this function.

4.1.3 History

„History“ function displays a menu with addresses of earlier displayed pages (which means pages to which you can get by the „Go back“ function). After selecting certain address a page with this address will be displayed. By pressing `ESC` you close the menu.

4.1.4 Reload

This function provide repeated downloading of page from network. Is being used especially when the page on the server changes and you want to display the latest version of the page (usually pages of various conferences undergo often changes, or it happens with other periodically generated pages). This function can be invoked by key combination `CTRL` + `r`.

During first invocation of this function, this page will be requested again from the network. If a PROXY cache is between you and the Internet, it can hapen that PROXY cache replies immediately from it's own cache and will not download the document from network. Therefore second and further „Reload“ requests the page again from the network, but this time forces downloading from the network even with PROXY cache. During second and subsequent „Reload“, a „Pragma: no-cache“ is actually present in the HTTP request.

4.1.5 Bookmarks

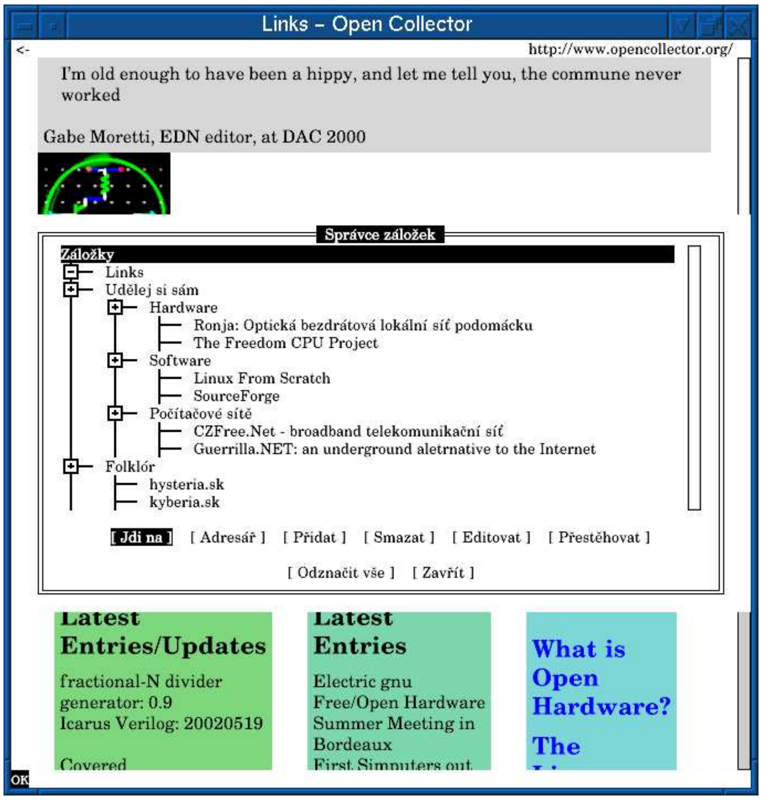
Bookmarks allow you easy storage of a pointer to an interesting page. They are being used the same way as bookmarks in a book.

The bookmark consist of a name (bookmark label) and URL. Bookmarks are ordered into directories, which makes orientation easier and increases comfort. After invoking function „Bookmarks“, a window with bookmark manager appears on the screen. In the top part of the window there is a list of bookmarks and directories (or their names).

At bottom border of the window you can then find buttons which allow managing the bookmarks.

There is a list in the upper part of the window. Cursor keys, keys `PAGE UP`, `PAGE DOWN`, `HOME` and `END` move the bar. You can select entry in this list like in a menu. Selected entry is again denoted by a bar with inverse background. Left and right arrow keys select button (by the lower edge of the window), by pressing enter you activate the button. By clicking left mouse button you select an entry. Scrolling is performed by holding middle button and dragging mouse up and down. Scrolling can be also done by a scrollbar at the right edge of the window.

Left from every entry there is a graphics symbol that depicts if it is a bookmark, open directory, or closed directory. Minus sign in a square means closed directory, plus sign in a square means open directory and horizontal line means a bookmark. Vertical lines show which directory the bookmark belongs to. By clicking directory symbol or moving on to directory and pressing space bar you can open or close a directory. By key adresář a stisknutím mezerníku adresář otevřete / zavřete. Klávesou `+` you open a directory, by key `-` you close it.



Now we will describe individual actions that can be performed using the buttons. Buttons work with an entry (bookmark or directory) with cursor. We will call this entry current entry.

- **Goto:** Shows the web page bookmark points to. If the cursor bar is over a directory, nothing will be performed.
- **Directory:** Creates a new directory. After pressing this button a dialogue will appear into which you enter name of the directory. After submitting a new directory under current entry will be created. If the current entry is an open directory, the new directory will be made in this directory. Otherwise the new directory will be created in the same directory depth as the current entry.
- **Add:** Work similarly like the „directory“ button, but creates a new bookmark.

Again a dialogue will appear into which you enter name and URL of a bookmark. If you have some page displayed, both these entries will be pre-filled-in with title and URL of the page. After pressing OK a new bookmark will be created behind current entry. As well as with directory, if the current entry is an open directory, new bookmark will be placed in it.

- **Delete:** Deletes the current entry. If it is a directory, also all entried within it will be deleted. Before deleteion you will be asked if you wish to delete the entry.
- **Edit:** Invokes a dialogue in which it's possible to change the current entry. For a directory you can change it's name, for a bookmark you can change it's label and URL. By button `OK` you confirm the changes, by button `Cancel` you cancel the changes.

Entries in the list can also be moved. This function is performed by button **Move**. First it is necessary to mark the entry you want to move. An entry can be marked by key `INSERT` or `*` (these keys unmark a marked entry and unmark marked one), or by clicking right mouse button on corresponding entry. The marked entry has an asterisk before it's name (in text mode) or a little square (in graphics mode). By button `Unselect all` you can unselect all entries. When a directory is closed, all entries inside the directory are automatically unselected.

Now, if you have all entries that you want to move marked, go with cursor bar over the entry behind that you want to move the selected entried and click button `Move`. Selected entries will be move behind current entry, if current entry is an open directory, the entries will be placed into that directory. Moved entries will be in the same order as they were before the movement (therefore the sequence of selected entried will not change). Directories will be moved including their contents.

Note:

Bookmark manager can be open only once. If you have more browser windows open and in one you have the bookmarks already open, then it's not possible to open them in a different window.

Bookmarks are stored into file `bookmarks.html` in directory `.links` in your home directory. Format of the file is compatible with format that browser of Netscape company use, therefore it's possible to have common bookmarks for browsers **Links** and Netscape. Path and name of the file, where bookmarks will be stored, can be selected in menu „Setup->Miscellaneous Options". In the same menu you can also set up encoding of the bookmarks file. If you change the file or encoding of the bookmarks, the changes that you have made in bookmarks, will be automatically stored and a file with new bookmarks will be loaded.

Changes in bookmarks (for example addition, deletion and similar) are automatically stored at exit of the browser. Therefore it's not necessary to explicitly save the bookmarks with some menu function. After first execution of the browser (actually when the bookmark file doesn't exist yet), a basic bookmark file will be created for you. This file will contain home page of **Links** and calibration procedure.

4.1.6 New window

Will create a new browser window. Works only on systems, where a window can be created. So that for example in windowing system, in X-term and similarly. Doesn't work on text console (where new windows cannot be created).

In svgalib and framebuffer graphics environments instead of opening a new window, lowest free virtual console number in **Links** will be assigned to a newly created virtual console. The page will be displayed on this console. Virtual console are being switched using keys `ALT` + `0` to `ALT` + `9`. If you close a console, console will disappear and the remaining consoles will remain as they are (they will not be renumbered).

4.1.7 Save as

Stores currently displayed page into a file. A dialogue for entering filename will appear after calling this function. The page will be saved under this filename. If such a file exists, it will be overwritten.

4.1.8 Save URL as

Works similarly as the previous function, with the difference that you will be first asked for URL of page to download, and then for a filename to store the page into. After entering both the page will be downloaded and saved.

4.1.9 Kill background connections

Closes all unused open background connections. Is useful in cases you don't want documents that won't be used to be downloaded. Example is a big file being downloaded over a slow line and you cancel the download. In this case the file is being downloaded in background (for case you will want it again). This however loads the line. Therefore this function is here which closes the background connection which frees up your line.

4.1.10 Flush all caches

Removes all documents from cache. Is useful when you want to reformat all pages that are to be displayed. Also useful for diminishing memory footprint of the browser.

4.1.11 Resource info

Displays information about connections, caches, timers and documents.

4.1.12 Memory info

Displays how much memory **Links** takes up.

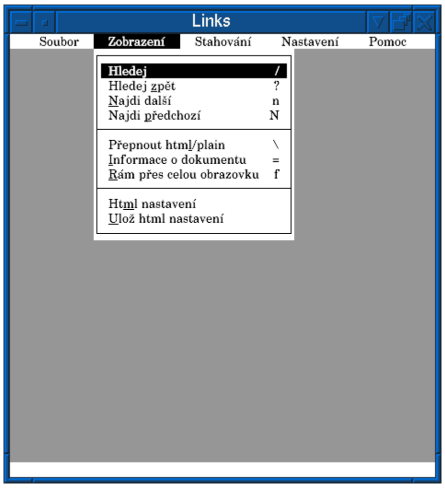
4.1.13 OS Shell

This function is available only in text mode. Performs a side-skip to commandline of your operating system. After terminating the shell (usually with the „exit“ command, depends on your operating system) you will get back into the program **Links**.

4.1.14 Exit

You can invoke this function alo by key `q`. The function closes current browser window. If you have open only one browser window, it ends the whole browser.

4.2 View Menu



Menu `View` contains function regarding displayed page: search in document, switching between formatted and nonformatted document, informations about the document and HTML settings.

4.2.1 Search

This function can be invoked also by hotkey `/` . The search function looks up a text in current frame starting from top and ending at bottom. After calling this function a dialogue will be displayed with text area into which you enter the desired text to find. Using up and down arrows you can page within a history of previously entered texts. To initiate the search click the `OK` button, by `Cancel` button you cancel the whole search window. Searched text will be emphasized by inverse background and the page will be shifted so that the text sought for be on screen.

During search letter case is being ignored. This however doesn't hold with letters with accents. Accented letters will be sought for in exact way. Therefore don't forget this behaviour during entering the text.

For explanation we'll show couple of examples:

1. **looking for a word „tree“:** words „tree“, „Tree“ and „TREE“ will be found
2. **looking for word „lavička“:** words „lavička“, „Lavička“ will be found. „LAVIČKA“ won't be found, because we entered lowercase „č“. Word „LAVIčKA“ will be found if it occurs in the text.
3. **going to search for „šuplík“:** only word „šuplík“ will be found, words neither „Šuplík“ nor „ŠUPLÍK“ will be found, because we entered letters „š“ and „í“ lowercase.

4.2.2 Search backeward

Search backward function works the same as search function with the difference that the text is being sought for from bottom to top (searching from end of the page). This function is invoked by hot key `?` (remembering is simple - for forward search key `/` is used and for ackward search `SHIFT` and `/` is used.

4.2.3 Find next

This function finds next occurece of searched text in direction of search. Therefore if searching forward it will find next occurence under the current one and with backward search it will find next occurence above the current occurence. The function can also be invoked by `n` hot key. The function shifts the page so that the found text be visible on screen.

4.2.4 Find previous

Similar to function „find next“, this function works with a difference that a previous occurence of the searched text is found. It means in opposite direction than the function „find next“ does. Hot key for this function is `N` , to find next occurence the key `n` can be used. To find the previous occurence `SHIFT` and `n` .

4.2.5 Toggle html/plain

This function switches between formatted and unformatted page display. Can be invoked by hot key `\` . Serves for example for display of HTML page source code. If you want to see HTML source, press key `\` . If you want to see formatted document back again, just press this key once more.

4.2.6 Document info

Displays a window with informations about server, code page, document size, date and more.

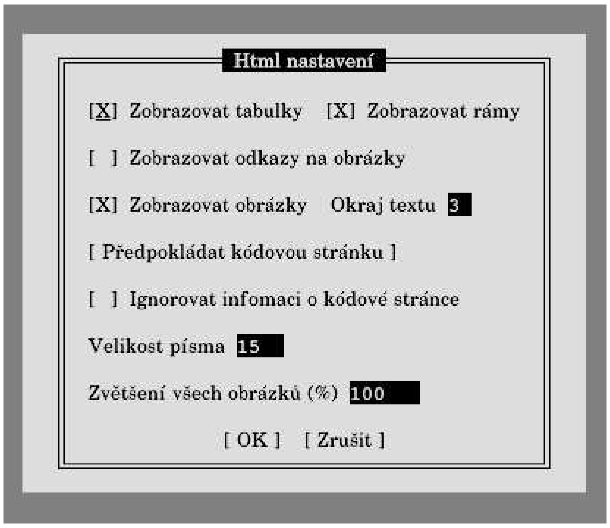
4.2.7 Header info

Like Document info, but displays HTTP header information instead.

4.2.8 Frame at full-screen

This function displays current frame over the whole screen. For display of the page in original form (with all frames) use the function „go back in history“. Function „frame at full-screen“ is being invoked by key `f`.

4.2.9 HTML options



In this menu, various settings regarding page display can be done. The menu contains these entries:

- **Display tables:** here you can turn on or off whether tables will be displayed as tables or just as dump of their contents.
- **Display frames:** is for turning on and off displaying frames. If frames are turned off, usually a page in version without frames is displayed, i. e. section „noframes“ in HMTL.
- **Display links to images:** if this option is enabled and images are not being displayed (you are in a text mode or you have image display turned off in graphics mode), then just a link is shown instead of every image.
- **Move by columns in table:** this option is available only in text mode, determines the way how links are numbered in tables. If this option is on, table links are numbered vertically, if off, horizontally.
- **Links are numbered:** Again available in text mode only. After ticking up this option, a number of the link will be displayed in addition at each link.
- **Display images:** This setting is available only in graphics mode. Serves purpose of turning on/off displaying of images.
- **Text margin:** Is for setting the space between text of page and border of the screen or browser window. Possible values are 0 to 9, basic setting is 3. The unit of the numbers is not specified.
- **Default codepage:** After pressing this button, a menu with possible codepages

will appear. Select the codepage the currently displayed web page has. **Links**is able to negotiate with most servers the page encoding, therefore it isn't necessary to manually set up codepage often. In spite of this, some badly configured servers don't specify the code page. In such case this default setting will be used.

- **Ignore information about code page:** is closely related to the previous setting. This option is used in case that the page is in a different encoding than the server says. In such case tick up this field and set up the right encoding (that in which the page is really) in „Default codepage".
- **User font size:** This setting is avilable in graphics mode only. Using this you can enlarge the letters on HTML page. The letter size is entered in points. It doesn't enlarge the letters in menu, there is a separate option for this under Setup -¿ Miscellaneous options.
- **Scale all images by %:** Again available only in graphics mode. This way you can enlarge or diminish pictures and conveniently view fine details which are not normally visible at ordinary size, or to fit picture onto screen if the picture is too large. Enter value in per cent (100 per cent is original size).

> **Warning!**
>
> If you set up different image scaling than 100% or font size different from 16 pixels, some pages can be displayed in a strange way (for example „fallen apart"), because they count on a certain size of images and text.

4.2.10 Save HTML options

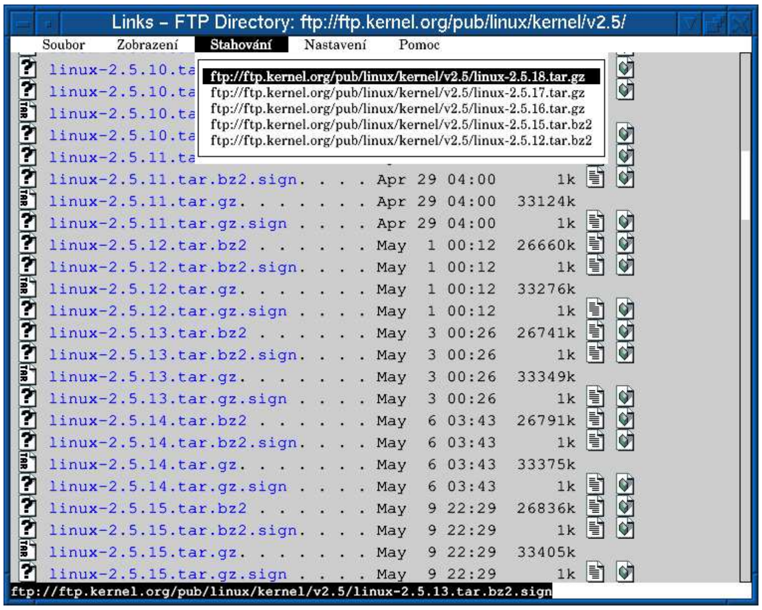
If you change some HTML option, then don't forget to save it into config file using this function. If you don't save the setting, all changes will be forgotten after leaving the program.

4.3 Link menu

Link menu contains actions that can be done with currently selected link. For example download, display image, follow link and similar. In graphics mode, this menu is displayed after clicking right button on the link.

4.4 Downloads menu

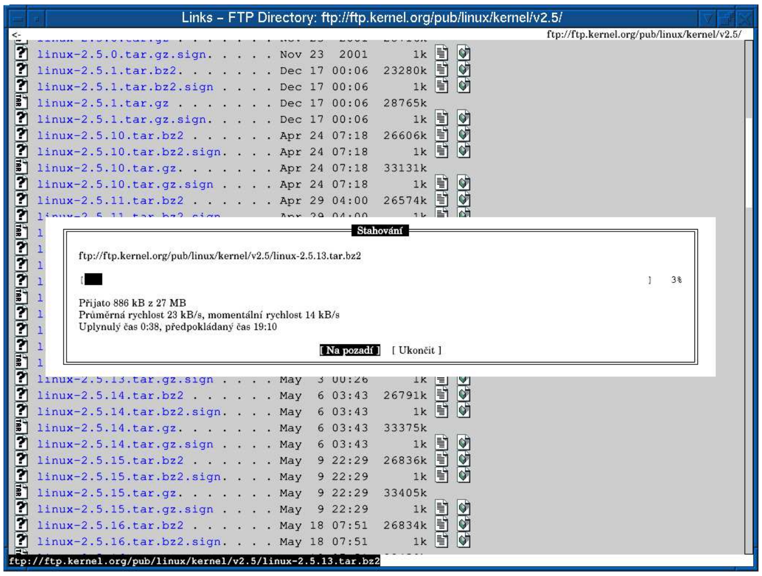
Contains an overview of files that are being currently downloaded in background. After clicking one of the items a window with detailed information and possibility to interrupt is presented. In the following picture you can see the menu with selection of individual files being downloaded.



The following information is displayed in the window displayed for particular file:

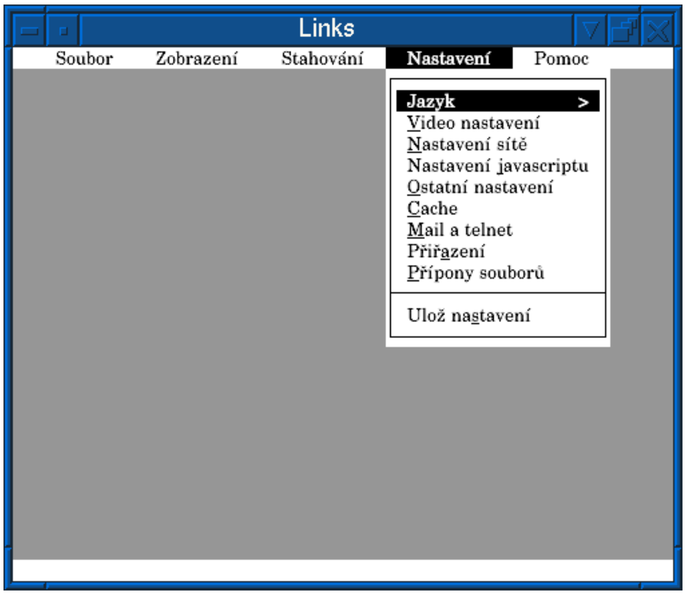
- size of the file
- amount of data already received
- average speed of download
- current speed of the download
- percent of the file size downloaded

This way a window with detailed information about particular file looks like:



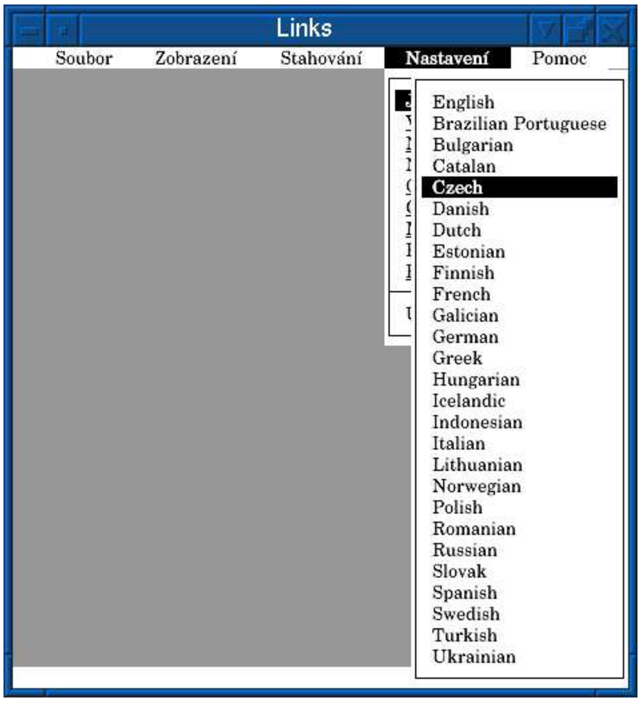
Clicking the button `Background` you put the download on background again. Button `Abort` you abort download. By `Abort and delete file` you abort download and delete partially downloaded file. Attention, the browser won't ask you if you press the buttons - it will immediately abort. Therefore if you press this button in error, the download will be aborted and you will have to download the file again.

4.5 Setup Menu



In this menu you can find all global settings of the browser, for example language setting, character set setting (applicable for text terminal only), network, terminal, javascript, cache, and similar. If you change some setting, then don't forget to click the entry `Save options`, which saves the change into configuration file. If you don't save the changes, the changes will be forgotten after closing down the program and the old values will be used when the browser is started up next time.

4.5.1 Language



This presents a menu, where you can select language of the menus. Up and down arrows select language, enter confirms the selection, the key ESC cancels the selection menu.

4.5.2 terminal options

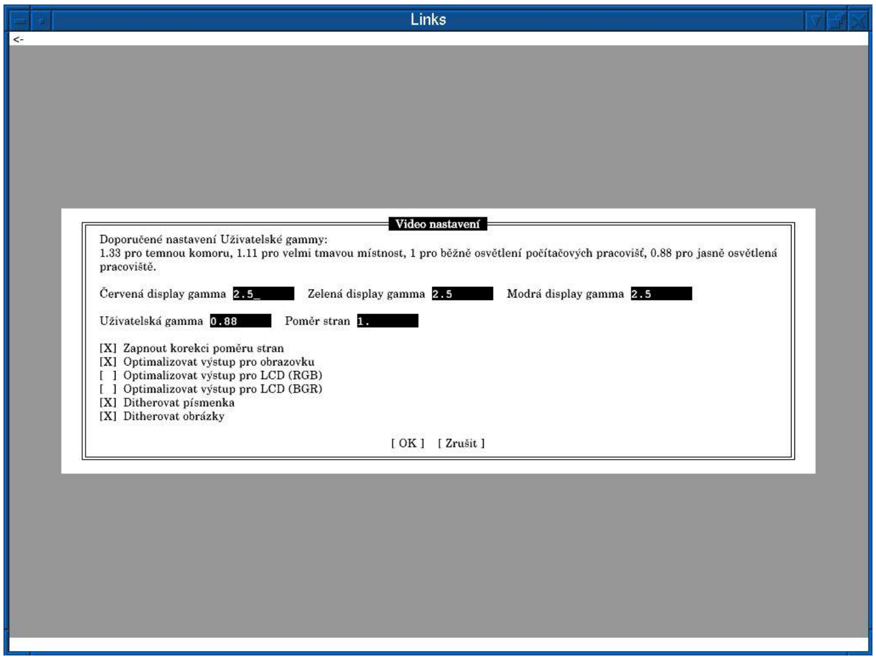
This entry is avilable only in text mode. Using this you can adapt the display to your terminal. After clicking this menu you'll see a dialogue, where you can select the following properties:

- **frames:** This governs how to display frames. Select one of the following possibilities: **No frames**, use **VT 100 frames** (if your terminal is compatible with VT 100), **Linux or OS/2 frames**, **KOI8-R frames**, and **FreeBSD frames**.
- **Restrict frames in cp850/852:** If you select this option, frame characters which are partially single-stroke and partially double-stroke will not be displayed, because they are not present in the cp850 and cp852 character sets.
- **Use ^11m:** Means that before the frame character this control sequence always should be sent. Linux usually needs this control sequence.
- **Use a block cursor**
- **Use colours:** If you have a colour terminal.

4.5.3 Video settings

The „Vide Settings“ entry is available only in the graphics mode. After clicking on it, the vide setting window will appear. It's possible to set momnitor gamma of your monitor, turn on / off image and text dithering, turn on aspect ration correction or an optimization for LCD displays.

The dialogue contains fields for entering gamma correction value for individual colour channels (red, green, blue) and then user gamma for correction of ambient lighting. The description of correct gamma setting follows.



Setting the gamma correction
First it is necessary for you to correctly set up contrast and brightness of your monitor according to the following instructions:

1. Set the monitor contrast to the minimum.
2. Darken the room or shade the edge of the screen with a hand.

3. Set the brightness to the minimum and then increase it exactly until the point when the black edge of the screen is starting to lighten up.
4. Set the constrast as you like it.

Table of gamma corrections for various lighting intensities:

Ambient lighting intensity	Illuminance [lux]	Gamma
Projection room	0	1.33
Darkened room	4	1.22
Dark room	16	1.11
Usual illumination of a computer workplace	64	1.00
Somewhat brighter computer workplace	256	0.94
Brightly lit workplace	1024	0.88

Now, when your monitor is correctly set, you can set up the gamma correction:

1. Set the user gamma to 1.0
2. Display the page `gamma.html` in the browser. You can find this page in the directory `doc`.
3. Look at the red field. If the right part is lighter than the left part, reduce the value of the red gamma. If the right part is darker, then increase the value of the red gamma.
4. Repeat this procedure until both parts are the same lightness.
5. Do the same for blue and green gamma.
6. Check the white field. Both parts should be the same brightness. If they are not, then you probably did something wrong and repeat the procedure.
7. If the white field is displayed correctly, set up the user gamma according to the following table.
8. Save the settings.

Warning!

If the recommended instructions are not performed, either by bad brighteness setting, or by bad gamma setting, images and letters will be displayed distorted. This will manifest for example incorrect colour tones, too dark or too pale parts of the picture, jagged edges of the letters, too dense or too pale colours and coloured garlands or stripes in fine transitions between colour tones.

On devices which perform upsampling or downsampling of the image incorrectly (some LCD monitors and projectors at certain resolutions) , the image will be displayed incorrectly at lower colour depths.

If you use **Links** on the X-Window platform, we recommend turning off the gamma correction performed by the X-Window system, if possible. This brings the finest colour reproduction. If you turn it off, then do the gamma setting in **Links** only after turning the gamma correction in X server off.

The fields `Aspect ratio` are for aspect ratio correction in graphics modes with non-square pixels. The usual ration (now we are talking about monitors with cathode ray tube) is 4:3. 4:3 corresponds to 800x600, 1024x768, 640x480 etc. With these resolutions, the pixels on the screen are square. With other resolutions (e. g. 640x400, 320x200) the pixels are elongated in one direction. So if you try to draw a square on the screen, you will see an oblong. Aspect ratio is to correct this problem.

Fill in the field `Aspect ratio` with ratio of monitor pixel width divided by monitor pixel height. So if the image is narrow and tall, insert a number greater than 1, if wide and low, set a number lower than 1.

In typical cases the default setting of 1 should be sufficient, because the graphics driver automatically determines the resolution and calculates a correction coefficient according to this, for a screen with 4:3 side ratio. If this is not enough (for example you have an atypical monitor), the coefficient has to be set manually.

By ticking up the field `Aspect correction on` you turn on the aspect correction. If the aspect correction if off, the pixels on screen are mapped 1:1 to pixels on the CRT/LCD.

Once more a summary: turn on the aspect ration correction, leave the value at 1 and try on the calibration picture, if the circle is displayed as a circle. If not then correct the shape by chaging the value. Increase if the picture is too tall and narrow, decrease if low and wide.

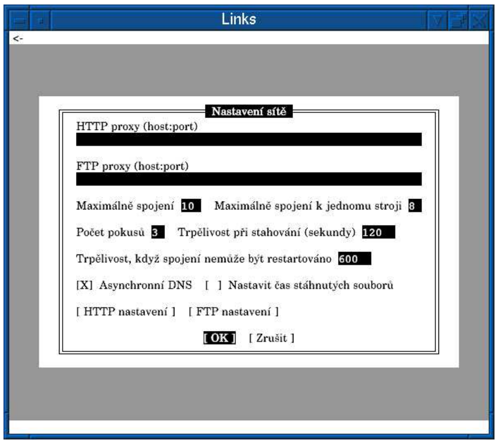
Furthemore you can set in this menu for what output device the picture should be optimized. Tick up one of the following possibilities:

- `Optimize for CRT` — if you have a monitor with a classical glass cathode ray tube
- `Optimize for LCD (RGB)` — if you are using an LCD monitor with Red, Green, Blue sequence of pixels (listed from left).
- `Optimize for LCD (BGR)` — if you are using an LCD monitor or display (for example on a notebook) with Blue, Green, Red sequence (listed from left).

You can find the sequence of the pixels on your LCD in technical parameters or you can look with a magnifying glass or try out the best sharpness of little letters.

The LCD display correction is necessary because on an LCD display the picture elements are side to side so the three separate images are shifted by 1/3 pixel. On CRT this is adjusted so the images exactly fit over each other.

4.5.4 Network options



In this dialogue you set parameters of network access.

HTTP and FTP proxy cache: if your network is behind a proxy server, it is necessary to set the address of your HTTP or FTP proxy server. If you don't know it, ask your network administrator. The address is inserted either as `address` or `address:port`. For example:

```
proxy.cache.intra
proxy.cache.intra:10000
```

If an HTTP proxy cache is configured, all HTTP requests will be set to the configured proxy on given address and port. Similar for FTP.

Furthermore various parameters of network connections can be set:

- **Max connections:** Determines the maximum number of open connections (generally).
- **Max connections to one host:** Determines the maximum number of open connections to a single host (server).
- **Retries (0-unlimited):** Number of attempts how many times a broken connection should be reopened.
- **Receive timeout (sec):** Time in seconds how long to wait when no more data are coming, before the connections is pronounced dead (and the browser will try to reconnect).
- **Timeout when unrestartable:** Time in seconds. After it elapses without any data coming, and a restart attempt was unsuccessful in the meantime, the connection is closed.
- **Async DNS lookup:** Whether aynchronous DNS lookup should be performed. If this option is on, several DNS translations can be performed at once and even download data during that. This speeds up download of files.
- **Set time of downloaded files:**If this is ticked up, downloaded files will have the time of last modification set identically to how this time is set on the server they are being downloaded from.

The **FTP options** button invokes a dialogue where you can enter a password for anonymous access to FTP servers. Some FTP servers require a password for anonymous access. The password is usually e-mail address of the one who is accessing the anonymous FTP server.

Warning!

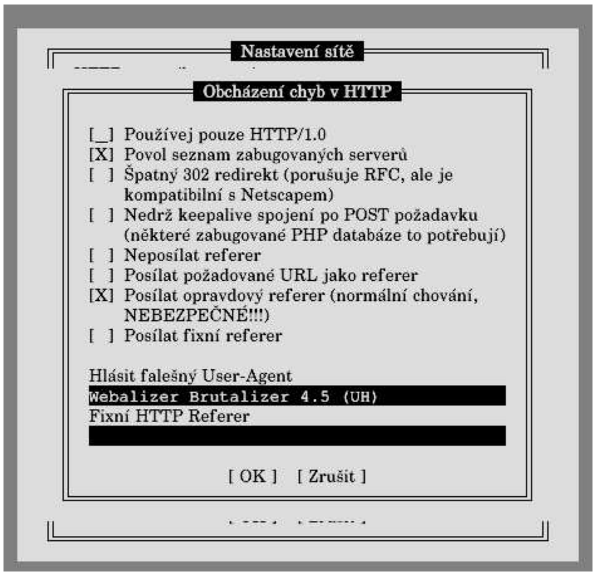
We do not recommend to enter your own e-mail address for an anonymous FTP password, because it can be misused by the FTP server operator for sending spam.

The button **HTTP options** invokes a dialogue for setting the properties of HTTP connections. In this dialogue you can set:

- **Use HTTP/1.0:** Some server still can't properly communicate with HTTP/1.1 protocol, therefore it is sometimes necessary to enforce an older 1.0 version of the protokol.
- **Allow blacklist of buggy servers:** If a server claims to support HTTP/1.1 protocol, but his protocol is faulty, the connection will be closed, the request will be done once more in HTTP/1.0 and the address of the server will be remembered so that any subsequent requests will be sent directly in HTTP/1.0
- **Broken redirect 302:** If an HTTP server sends a „302 redirect" reply to a POST request, the browser according to the HTTP specification should send a POST request with the same data to the new server. However Netscape and IE

browsers violate this specification and instead of POST request they send a GET request. If you tick up this option, **Links** will behave like Netscape or IE and will send a GET request. Some badly configured server require this behaviour.

- **No keepalive connection after POST request (some buggy PHP databases need it):** This option causes that the connection will be closed after sending a POST request. If more communication is necessary with the server, a new connection will be open. This behaviour is suboptimal and slows down unnecessarily, however some servers (especially PHP databases) require it.

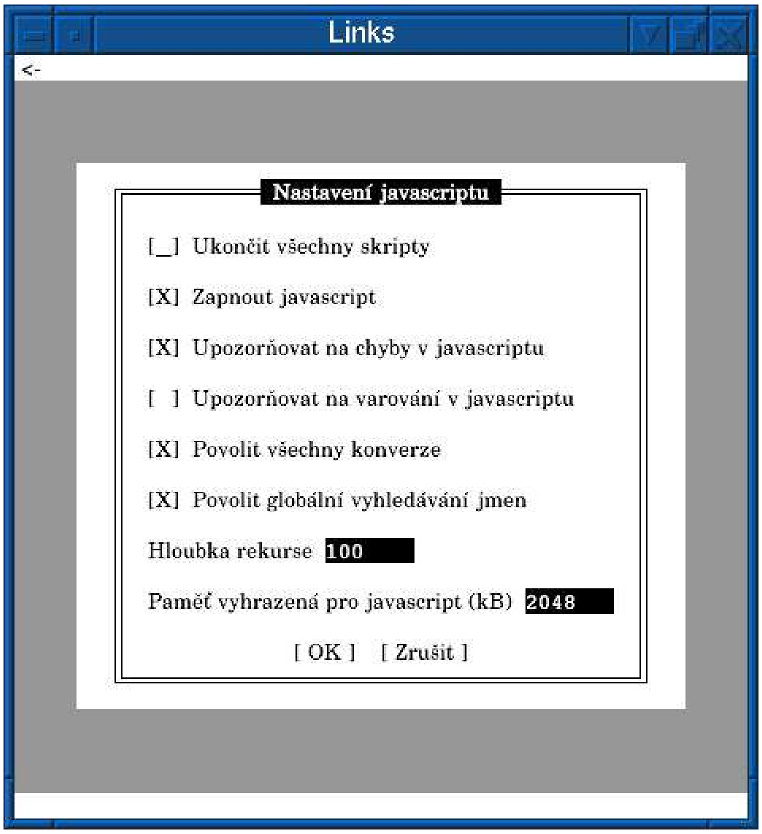


Furthermore you can set the referer to one of the following possibilities. HTTP rerefer means that the browser sends an information to the server telling from which page you got to the currently loaded page. However this is not secure as you may wish to keep this information undisclosed. The following are your options:

- **No referer:** The information is not sent at all (default setting). Some servers however require the referer and for these you can select from the options below.
- **Send requested URL as referer:** Send the address of the page itself as the referer.
- **Fixed referer:** You can fill in your own text into the text field below. This will be sent as the referer if you tick up this option.
- **Send real referer:** Sends the page from which you got to the page being currently loaded. This is the right behaviour (according to the HTTP specification), but we repeat once more, this is **not secure**.

You have an option to fill in a text into the **Fake User-Agent** field. This text will be sent to the user as user-agent. User-agent is an information about your browser and operating system. By default a true information about your operating system and **Links**browser is being sent. If you insert any text into this field, then this text will be sent instead and the server will never know your real operating system and browser. If you leave the field empty, the true user-agent will be reported.

4.5.5 Javascript Options

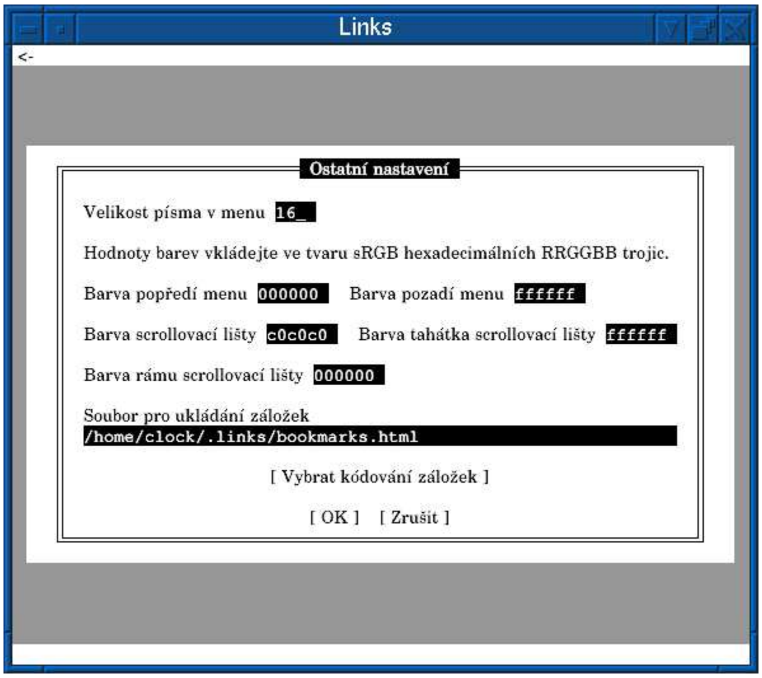


In this dialogue you can set up various parameters of the javascript interpreter.

- **Kill all scripts:** If you tick up this field and you confirm the setting by pressing the OK button, the javascript interpretation on the page will be forcefully ended. This helps for example in cases where the javascript infinitely loops, or annoys.
- **Enable javascript:** This switch switches javascript on and off.
- **Verbose javascript errors:** It's purpose is to suppress displaying errors in javascript.
- **Verbose javascript warnings:** It's purpose is to suppress displaying warning messages during javascript runtime.
- **Enable all conversions:** Allows using undefined variables, converting a function into a number and so on. However will not allow for example converting an undefined object into an object.
- **Enable global name resolution:** Allows resolution of names in the document in the main address space. Is meant for cases when the page authors refer items from the document object without explicitly stating this.
- **Recursion depth:** With this value you set maximum allowed depth of recursion for javascript functions. The default setting is 1000. This parameter is set for security reasons. If the recursion depth were unlimited, it could happen that the javascript function on some page will call itself infinitely, which would understandably exhaust all available memory. If the default value is not enough for you, you can increase it (up to 999999).
- **Memory dedicated to javascript (kB):** Maximum allowed amount of memory (in kilobytes) the javascript is allowed to ocupy. Again for security reasons to

prevent javascript from taking too much memory and this way unnecessarily overloading your system. The minimum value is 1024kB, maximum value is 30720kB, default value is 5120kB.

4.5.6 Ostatní nastavení



In the dialog window „Miscellaneous options“ in graphics mode you can set the menu letter size. Furhter you can set the file where bookmarks are stored and character encoding of the bookmarks.

Menu font size determines how big letter should be in the menu. The size is counted in screen pixels.

In this dialogue you can set colours of various parts of the menu: **foreground**, **background**, **scroll-bar**, **scroll-bar knob**, and **scroll-bar frame**. All colours are entered in the form of hexadecimal triplet of bytes R,G,B (red, green, blue). That is a group of six characters `0-9`, `a-F`, for each components two characters. For example `00ff00` is bright green, `000000` is black, `444400` is dark yellow, `a700a7` is light violet, `ffffff` is white and so on.

Bookmarks file is a file into which the bookmarks will be saved (see the chapter about bookmarks). By default a file `bookmarks.html` is used in directory `.links` in your home directory. In this dialogue you can change the bookmark file, for example when you want to share bookmarks with other browsers. When you are changing the bookmarks file the changes you have already done will be saved into the old one and the new file will be automatically loaded.

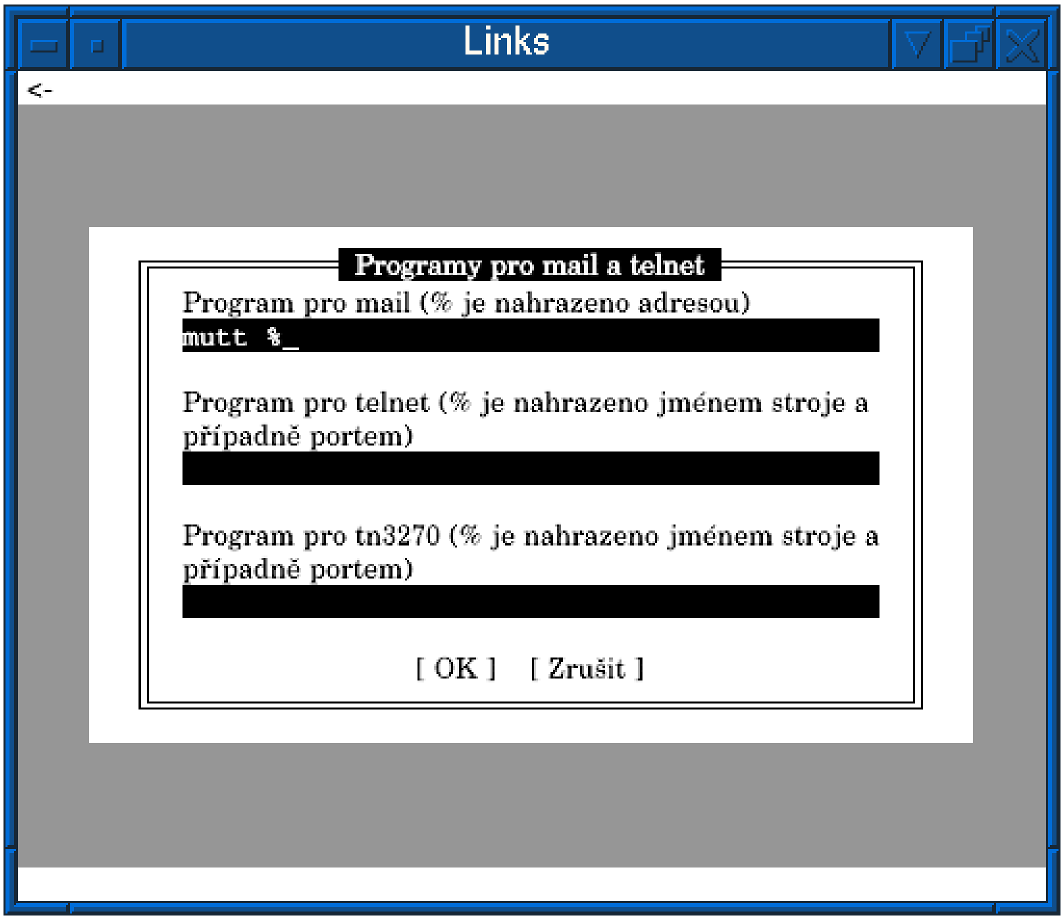
After clicking on **Bookmarks encoding** you will have an option to select from encoding in which the bookmarks file will be stored. Similar to change of the filename, a change in the encoding causes the pending changes to be saved into the old file in old encoding and a new file in new encoding will be loaded.

If it is not possible to determine keyboard input encodingin graphics mode from the environment variables, this menu contains one more entry. The entry is a button marked **Keyboard encoding**. After pressing this button you will be presented with a choice of encoding in which your keyboard is sending the characters. This setting is different for each graphics driver. For example you can have a different encoding for SVGAlib than for X-Window system. Encoding selection is always related to that graphics driver you are currently running under.

4.5.7 Cache

In this dialogue you can set the cache size for document cache (in kilobytes) and number of formatted documents that can be stored in the cache. Maximum number of documents in the cache is 256.

4.5.8 Mail and telnet



In this doalogue you can set programs for mail and telnet. They are used for links like „mailto:“, „telnet:“, and „tn3270:“. The dialogue contains three text fields: program for mail, program for telnet and program for tn3270. Write commands which should be executed into these fields, the character „%“ will be replaced by the address (in case of mail program) or name of machine and port (in case of telnet).

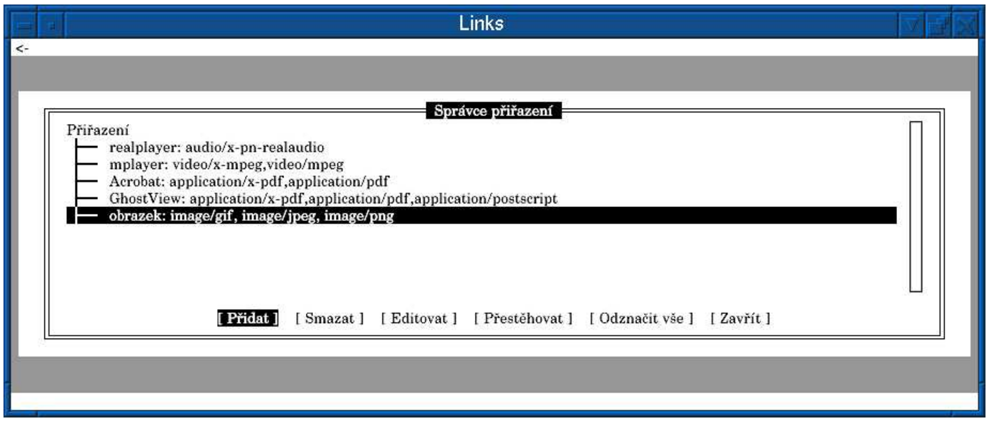
4.5.9 Associations and extensions

These two functions allow you to set execution of external programs for unknown file types. Each file received over the network has so called MIME type. The MIME type is a text string consisting from two parts separated by a slash. The part before slash is so called main type which says if it's text, image, audio etc. The part after slash is defining the file format. For example when the main type if audio then it can say it's MP3 format. In the table below you can find an overview of some of the widely used MIME types.

Format	Description	MIME type	Extension
GIF	image format	image/gif	gif
JPG	image format	image/jpg image/jpeg	jpg
TIFF	image format	image/tiff	tiff
PNG	image format	image/png	png
PCX	image format	image/pcx	pcx
BMP	image format	image/bmp	bmp
AVI	video format	video/x-msvideo	avi
MP3	audio format	audio/mpeg	mp3
OGG	audio format	application/x-ogg	ogg
RealAudio	audio format	audio/x-pn-realaudio	ra
PostScript	format for document transmission	application/postscript	ps
PDF	format for document transmission	application/pdf application/x-pdf	pdf
DVI	format for document transmission	application/x-dvi	dvi
DOC	format for document transmission	application/x-doc	doc

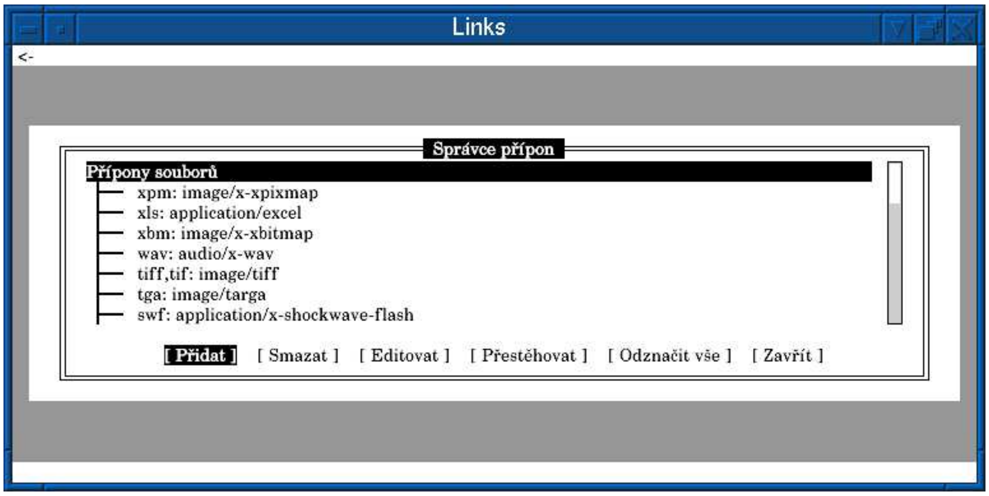
The **Links** browser can display only text and images, however it allows setting external programs to be executed for MIME types it doesn't know, for example for autio files. For this there are these two functions. In the „associations“ function you can set an external program and MIME types, for which this program should be executed. In the „extensions“ function you can set assign MIME types to file extensions for case the MIME type is not known or not possible to get from the server and the MIME type is to be derived from filename extension.

Both associations and extensions are managed in a window very similar to the „Bookmark manager“ window. After invoking the „Associations“ or „File extensions“ function, a window labeled „Associations manager“ or „Extension manager“ appears.



The work with Associations manager and Extensions manager is the same, therefore we first describe the elements common for control of both parts and at the end we describe windows for editation and addition which differ between associations and extensions.

Like in the bookmark manager, there is a list of extensions or associations in the top window. There are buttons **Add**, **Delete**, **Edit**, **Move**, **Deselect all** and **Close** at the bottom. Each extension or association shows a label and a mime-type after a colon which belongs to the association or extension.



It is possible to select an entry in the upper part of the window similar to a menu. The selected entry is again highlighted by a bar with inverse background. It is possible to move the bar with cursor keys and `PAGE UP`, `PAGE DOWN`, `HOME`, and `END` keys. With left and right cursor keys we select the button (in the lower part of the window), pressing `ENTER` activates the button. By clicking the left mouse button we select an entry. You can scroll by holding the middle mouse button and moving the mouse up and down. It is also possible to scroll with the scrollbar at the right part of the window.

Now we are going to talk about individual actions that can be performed using the buttons. The buttons always have effect on the entry (extension or association) which is signified by the cursor. We will call this entry current entry.

- **Add:** Creates a new entry, after pressing this button we are presented with a dialogue, into which you fill in the informations about the new entry. Pression OK creates a new entry right after the current entry. Clicking `Cancel` revokes the current editation.
- **Delete:** Deletes the current entry. You will be asked if you really want to delete this entry before the entry is deleted.
- **Edit:** Invokes a dialog where it is possible to change the current entry. By pressing `OK` you confirm the changes, by `Cancel` you cancel them.

It is also possible to move the entries in the list. And this is what the button **Move** is for. First it is necessary to mark the entries we want to move. An entry can be marked by the `INSERT` key or `*`. These keys unmark a marked entry and mark an unmarked one. It is also possible to mark entries by clicking the right mouse button on the entry. A marked entry has an asterisk in front (in text mode) or a square (graphics mode). If you press the **Deselect all** button, all entries will be unmarked.

Now, when you have all entries you want to move marked, go with the cursor bar over the entry behind which you want to move the entries. Then press the **Move** button. The marked entries will be moved just after the current entry. The marked entries will be in the same sequence they were before the move (that means the relative sequence of the marked entried is unchanged).

Note:

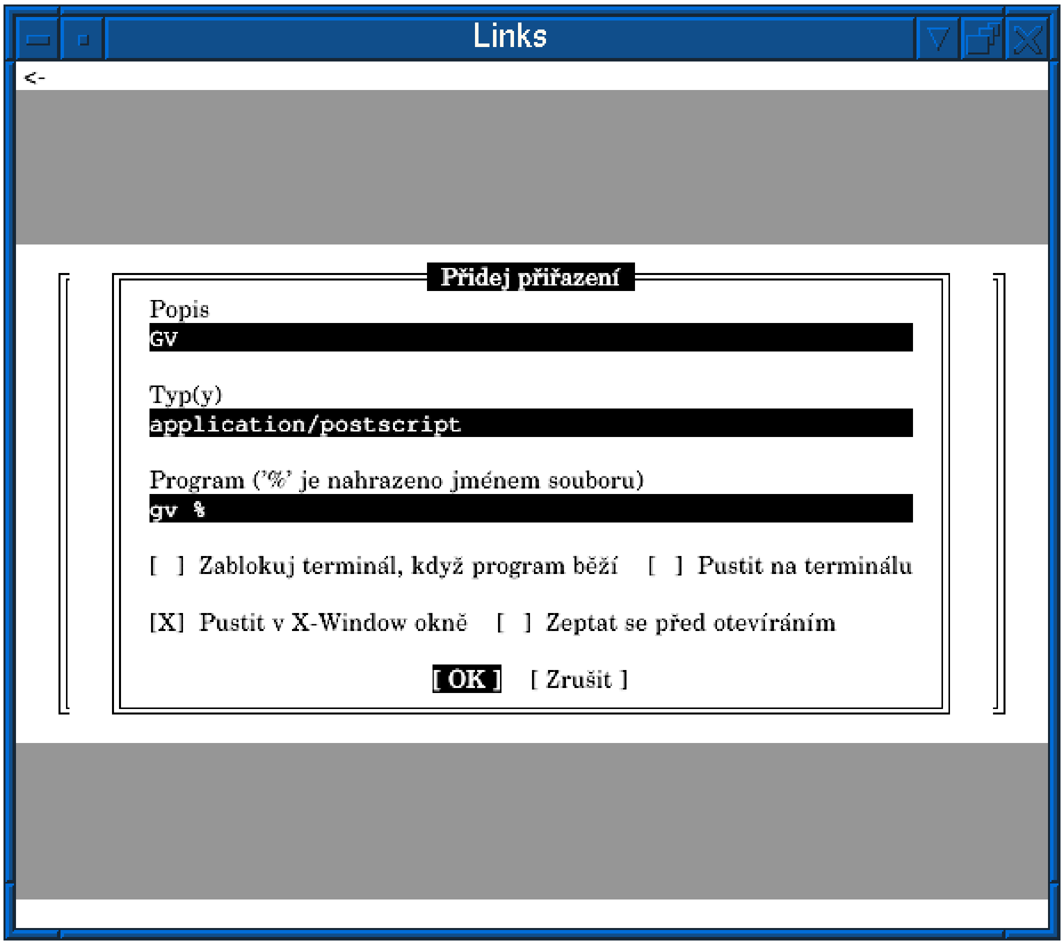
Both extension and association managers can be opened only once. If you have multiple windows and there is an associations manager (or extensions manage) already open in one window, it is not possible to open the same manager in the other windows. A message will be displayed in that case.

Warning!

If you perform any change in associations or extensions you have to save the browser settings. If you don't save them, they will be treated as temporary and will be forgotten when the browser is terminated.

Associations

The dialogue for editing and adding new associations looks like this:



- Fill the **Label** field with the name of the association (can be an arbitrary text).
- Fill the **Content Type(s)** field with a comma-separate list of MIME types. Do not insert spaces next to the commas. Or insert just one MIME type.
- Fill the **Program** field with commandline (including possible parameters) that should be executed on the entered MIME types. The „%“ character will be replaced with a filename.

- **Block terminal while program running:** Blocks the terminal while the given program is running, i. e. you will be returned into the **Links** browser only after the program exits.
- **Run on terminal:** That means whether the program is allowed to be excuted on a terminal. For example some programs run only on a windowing system and it doesn't make sense to run them on a terminal.
- **Run in X-Window:** It has a similar meaning like the previous one with the difference that it's about running in a window of an X-Window system.
- **Ask before opening:** If you tick up this field you will be asked on each encounter whether you want to download the file, view, run the external program or it, or cancel.

Here are example of MIME type settings:

```
Label: ZGV
Content-Type(s): image/gif,image/jpg,image/pcx,image/bmp,image/png
Program: zgv %

Label: Acrobat
Content-Type(s): application/pdf,application/x-pdf
Program: acroread %

Label: MP3
Content-Type(s): audio/mpeg
Program: mpg123 -2 -v -b 500 %
```

Of course you can set more programs for a single MIME type (for example multiple PDF viewers). If you set more program, a dialog will be presented before executing the external program, where you can select which of the programs should be executed.

File extensions
This function allows certain file extensions to be bound together with a concrete MIME type. The extension is used in the case when it is not possible to determine the MIME type from a server. The type is then determined from the filename extension. Editation and addition of a new extension invokes a dialogue into which you enter a list of extensions (without the dot) separated by commas, and a MIME type on which these extensions should be mapped. So for example:

```
Extension(s): gif
Type: image/gif

Extension(s): pdf
Type: application/pdf

Extension(s): dvi
Type: application/x-dvi

Extension(s): jpg
Type: image/jpeg
```

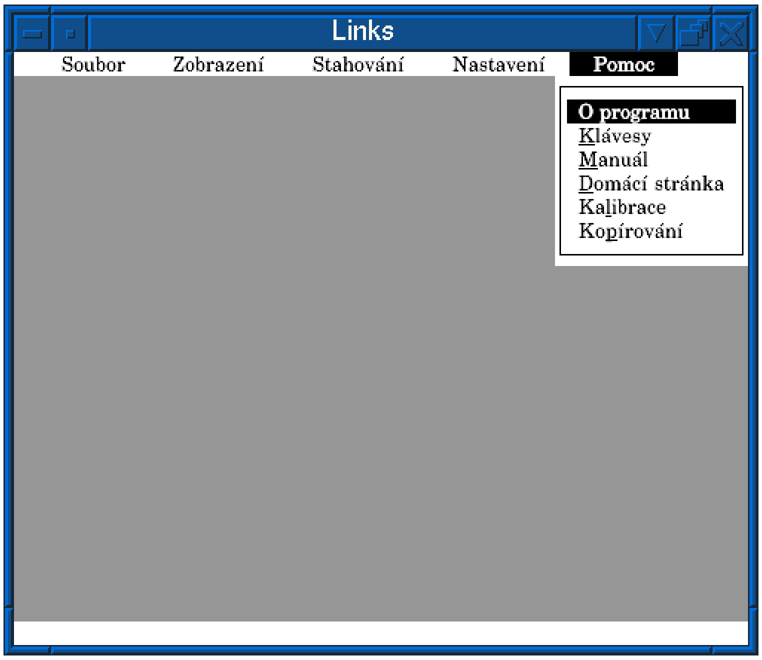
If you are running the browser for the first time, extensions for basic file types (images, graphics formats, documents, music files, animations etc.) will be automatically created.

4.5.10 Save settings

Saves the settings into the configuration file. If you change some setting and don't save the settings later, then the change will be forgotten when the browser is exited. Therefore do not forget to save the setting if you change something and want it to be kept for the next execution of the browser.

4.6 Help menu

The `Help` menu contains a help for the program: a list of keyboard functions, on-line manual and program licence information. The `Keys` entry displays a window with a list of hotkeys. After pressing the `User's manual` entry an online manual will be displayed (works only if you are connected to the Internet network). If you are connected to the Internet you can also visit the **Links** homepage by clicking the `Home page`. By clicking `Calibration` you get on the browser calibration procedure that needs to be performed after the first execution of the browser. This function works again only when you are connected to the Internet.



5. Examples

In this chapter we are going to present several comprehensible examples of **Links** browser control.

1. **Displaying the www.linux.cz page**
   Run the browser and press the key `g`. A dialog for entering URL will appear. Enter „www.linux.cz" into the dialog. Click „OK" and wait until the page is displayed.
2. **How to change the page encoding to win-1250**
   Invoke the menu by pressing `ESC`, click on „View", click on „HTML options", click on „Default codepage", select „Windows 1250" from the menu, press `ENTER`, tick up the „Ignore charset info sent by server" field and click „OK".
3. **Setting proxy server proxy.local.net and port 8000**
   Invoke the menu by pressing `ESC`, click „Setup", click „Network options". Enter „proxy.local.net:8000" into the „HTTP proxy" and „FTP proxy" fields and click on „OK".

4. **We want to search for the word „cemetery" on a page**
   Press `/` , a dialogue for entering searched text will appear. Enter „cemetery" and click „OK". If the text occurs in the page, it will be marked by inverse background.
5. **Adding a bookmark on www.praha-mesto.cz into the „Cities" bookmark directory**
   Display the page „www.praha-mesto.cz", press `s` . A window labeled „Bookmark manager" will be displayed. Click „Folder", a dialogue will pop up, enter „Cities" and click „OK". A directory labeled „Cities" will be created. Move over the „Cities" directory and press `+` , the directory will open. Click „Add", a dialogue for adding bookmarks will appear. The URL will be already filled in, change the name if you want. Click „OK" and the bookmark will be added into the directory. You can close the bookmark manager by clicking „Close".
6. **Running Links in X-Window system on the remote machine `hammer-5.forge.cz` and display `0:0`**

   ```
   links -g -driver x -mode hammer-5.forge.cz:0.0
   ```

6. Problems and frequently asked questions

6.1 Solving problems

1) **I want to run the browser in graphics mode but it's still running in the text mode.**
   You forget to include the `-g` switch in the command line. Run the browser with this option.
2) **I am running the browser in graphics mode on remote computer and I am getting the message „Not running in a graphics capable console, and unable to find one."**
   Your environment variable`DISPLAY` is not set and the browser doesn't know to which X server it should connect. Set the `DISPLAY` variable to match your display, or run the browser with the `-mode display` option, where „display" determines your display.
3) **When I am using Links in SVGAlib the browser (or the whole system) craashes. What should I do?**
   This is a mistake of SVGAlib and the design of virtual consoles in Linux kernel. Ask their authors to fix the bug.
4) **When I run Links in SVGAlib, switch to another console and then back, Links stops running and a message reads „Segmentation fault". What should I do?**
   We know about this problem, it's an error of SVGAlib, more precisely of it's kernel part, which crashes during console switch. The only solution to the problem is that the authors of SVGAlib fix it. Therefore write an e-mail to them so that they have a motivation.
5) **After running the browser on X-Window system an error message „No supported color depth found" pops up and the program terminates. Can I do anything with that?**
   Unfortunately you have a display that is not supported by **Links**. It can be either a grayscale dusplay, a display with low number of colours (less than 16), or it is not possible to set a private colour palette. The program requires a colour display with at least 16 colours and a possibility to set a private palette. This problem occurs in some X-servers for Windows and nothing can be done against that unfortunately.

6) **Why is the mouse cursor on framebuffer moving in jerks and not smoothly?**

Because `gpm` is used for reading the mouse and `gpm` is character-oriented. The text mode has less pixels than graphics mode, therefore the mouse pointer would move too slow. Therefore the movement is multiplied by a constant and therefore in little steps.

7) **Can anything be done against that?**
Yes, patch `gpm` to support graphics. Write to the `gpm` authors that they should built in a graphics support. If you have administrator privileges, apply the enclosed patch `PATCH-gpm-1.20.0-smooth-cursor` on the `gpm` sources. The patch is for the 1.20.0 version but it will probably work also with other versions. Then recompile the `gpm`.

8) **Can I then move the mouse smoother in this situation?**
Yes, using the keys `F5`, `F6`, `F7` a `F8`.

9) **And why is gpm being used then?**
Because on framebuffer there is no other way how to read the mouse.

10) **The mouse on my framebuffer doesn't work but `gpm` is running and works. What to do with that?**
Try whether the mouse works in other applications on the console (for example Midnight Commander). If it doesn't work even in other applications, it is not a mistake of **Links**, but your `gpm` is installed improperly.

11) **I am connected through an SSH connection on an X-server and Linksis slow on pages with lots of images. Why?**
This is not caused by **Links**, but by the SSH connection, over which the megabytes of images have to be transfered. As all the data are being encrypted it takes long time. Therefore do not use SSH and connect to the X-server directly unencrypted.

12) **Why the left arrow doesn't work for going back in history in graphics mode?**
Because the arrows are used for scrolling. Use the key `z`. Left arrow works only in text mode for backward compatibility with older versions and Lynx.

13) **The page looks „fallen apart". What is the cause?**
You have probably changed the text font size or image zoom factor in HTML options and the page is counting with certain text size or image size. If you want the page to be displayed correctly set text size to 16 and image maginification to 100% in the „HTML Options" menu.

14) **Why the animated GIFs don't animate?**
Because **Links** contains an active filter for removing advertsm which displays only the 1st frame from animated GIFS as animated GIFs don't bring any additional information and during remote execution they unnecessarily load the network. In **Links** the user is not pestered by constantly flashing adverts, he can concentrate on reading the text and during remote execution the expensive bandwidth is not being wasted.

15) **On my page the text is blue on dark blue background. Why does Links display a yellow text on dark blue background?**
Blue text on dark blue background is **VERY** badly legible, therefore **Links**, if it evaluates text as badly legible, displays the text with as much contrast color as possible on the original background. Unfortunately there are even such authors of web pages which think this way their pages will be original and irresistible this way. However with the **Links** you will be able to read them without problems.

16) **Why doesn't Links display background images?**
Links doesn't display background images intentionally, because background images don't bring any extra information to the page and just degrade the text legibility. If the background images were displayed, the font cache would be unnecessarily raped which would just bring an unnecessary slowdown. During execution on a remote computer over a network the **network bandwidth would be wasted spectacularly**, as practically each letter would have to be transmitted again, as it would happen to have a different background (for each occurence of the letter A the whole bitmap of the letter would have to be transmitted again, as each occurence of the letter A would have a different background or the same background shifted by a different amount of pixels). This would render the browser practically unusable for remote execution.

6.2 Frequently asked questions

6.2.1 How do I do in Links...

1) **How do I restart a connections when it's stuck?**
Quit the connection (with the back function or by stopping the download), click „Kill all connections“ in the menu and run the connection once more.
2) **How do I refresh a stale page or image?**
With the „Reload“ function, or leave the page with the „Back“ function, click „Flush all caches“ and load the page once more.
3) **The letters are too small and I cannot read them. How do I make them bigger?**
You can enlarge the letters in menus in the „Setup->Miscellaneous options“ menu. Enter the desired pixel height into the „Menu font size“ field. Letters on pages can be enlarged in the „View->HTML options“ menu in „User font size“ field.

6.2.2 General questions

1) **Does Links support javascript? If yes, then what version and with what limitations?**
Yes, **Links** really supports javascript, even in text mode. It is directed by the javascript 1.1 specification from Netscape Corporation.
2) **I have heard that Links supports gamma correction, is it true?**
Yes. But only in graphics mode.
3) **What is the gamma correction?**
Exponent of transfer functions of elements of display chain. You can find more on
`http://www.inforamp.net/ poynton/notes/colour_and_gamma/GammaFAQ.html`
4) **Why is Links suddenly graphical?**
To make images possible to display. It's a bit difficult to display images in text mode.
5) **Why do you write Links?**
Because we like it and we want to view web pages with a good browser.
6) **Why didn't you just add image display in AAlib into text Links?**
Because AAlib has mediocre resolution.
7) **Why doesn't Links have a graphics driver also for AAlib?**
Because AAlib has a mediocre resolution.
8) **Are you going to implement Java into Links?**
No.
9) **Why is Links written in C?** Because C is an universal programming language characterized by efficient expressions, modern flow control and a multitude of operators. The generality of the C language makes it more suitable and efficient for much tasks than other „more powerful“ languages.
10) **Have you written Links according to some norm? According to what?**
We have written it according to ANSI C, to attain portability on as many systems as possible.
11) **Why isn't Links object oriented?** Becuase the C language doesn't have objects.
12) **Why isn't Links multiprocessor/multithreaded?** Because a singleprocessor and singlethreaded one is more efficient.
13) **Why didn't you use GTK or other toolkit for Links development?**

Because these toolkits take up too much space, are not portable, need not necessarily be installed on every computer (why should a user install a multimegabyte toolkit together with **Links**?), bring unnecessary program slowdown, annoy with thousands of windows and are incompetent. For example in GTK it's impossible to dictate the gamma with which the dialogues should be displayed or it is impossible to scroll with middle mouse button in the file selection dialogue.

14) **Why doesn't Links have a button bar and a line for entering URL?**
Because these don't have a practical use and just take up 1/5 of the screen, therefore they make a 15-inch monitor from a 17-inch one. This would be appreciated especially by users of low resolutions, for example 640×480.

URL entry line is utterly impractical because the user has to laboriously try to hit it with the mouse. Pressing one key more (to invoke the URL entry dialogue) is much more practical and faster. The dialogue takes screen space during entering URL, otherwise not.

15) **Why plugins from browser XXX cannot be plugged into Links?**
Because there is no standardized interface for plugins, so that each browser has it's own one. The plugins are also insecure that a crash of the plugin causes a crash of the whole browser, which is wrong.

Appendix A

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Version 2, June 1991

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