&

Perl

by
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What is WebKit?

It's an open source web browser **engine** (not a browser).

A fork of KHTML (Konqueror) by Apple.

It's a library

Composed of 2 sub libraries:

- WebCore (HTML rendering engine)
- JavaScriptCore (JavaScript engine)

With bindings for multiple languages (including Perl).

Used by

Browsers

Safari, Google Chrome, Epiphany, Konqueror

Applications

Mail.app, Entourage (OS X), Steam

OSes

iOS, Android, Kindle

Toolkits

Cocoa, Qt, Gtk, SDL, WxWidgets, Win32, Adobe AIR

Web technologies

- HTML 4 and 5
- JavaScript
- CSS 1, 2 (almost complete) and 3 (incomplete)
- DOM
- SVG
- XML and XSLT (through libxslt)

Why use WebKit?

If it quacks like a duck, acts like a duck, ...

- Executes JavaScript
- Loads derived resources (stylesheets, iframes, favicon, ...)
- Loads resources like a browser does (limited connections, etc)

Using WebKit with Perl

Multiple bindings exist for WebKit in CPAN:

- Gtk2::WebKit - hand written
- Gtk3::WebKit - Glib introspection (GIR) generated at runtime

GIR

Automatic language bindings generated at runtime

GNOME desktop uses this for all its new bindings

Material for a separate talk

How can we use WebKit?

Besides writing a web browser? :)

Custom GUIs with HTML, CSS and JS (ex: control rooms monitors)

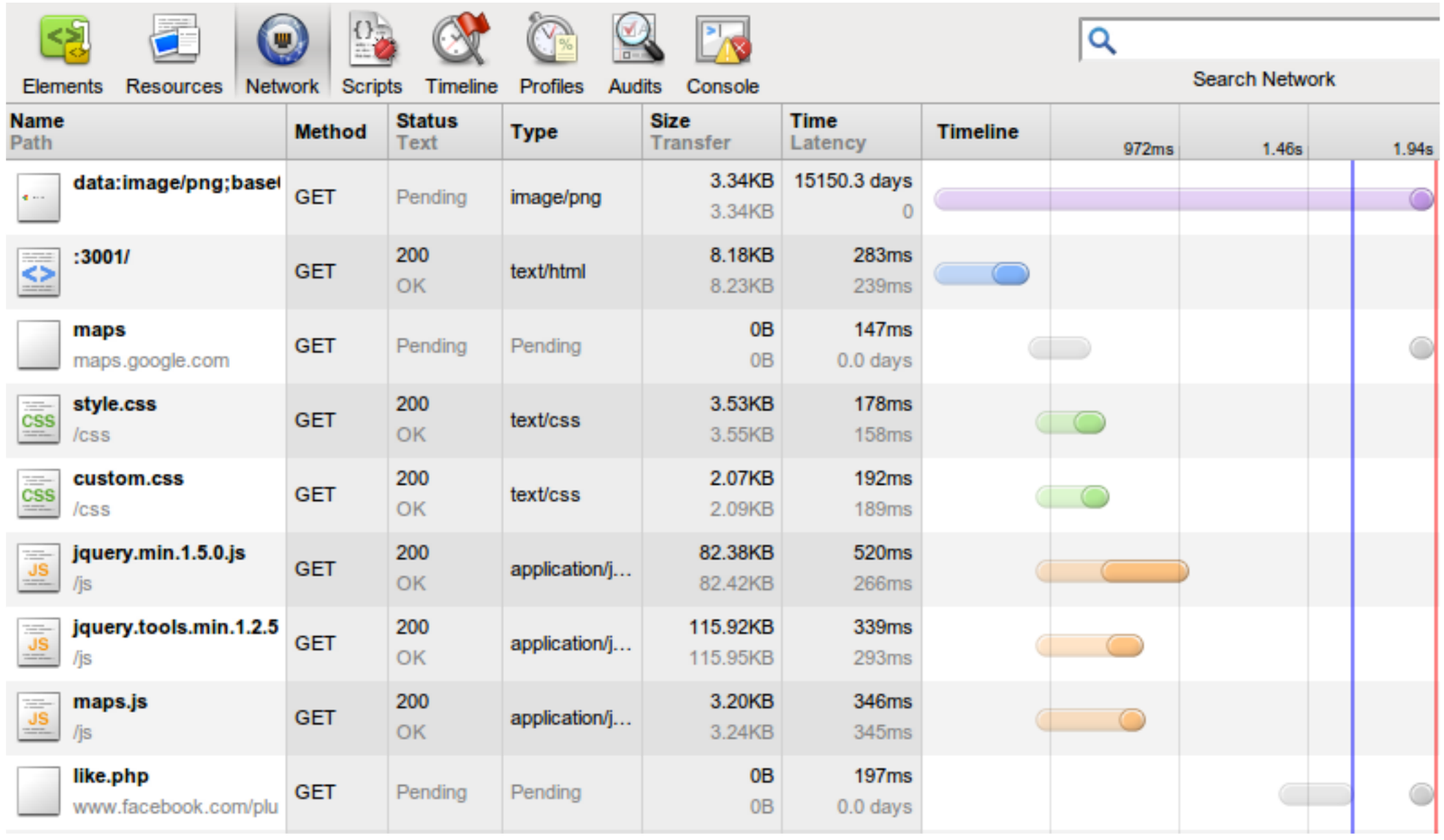
Web page profiling (ex: page size, resources, download time)

Automation

- JavaScript interaction
- Network stack (via libsoup)
- DOM
- Screenshots (PNG, PDF, SVG, PostScript)
- Web scrapping

Web Inspector

We can rewrite/automate the functionalities of the Web Inspector



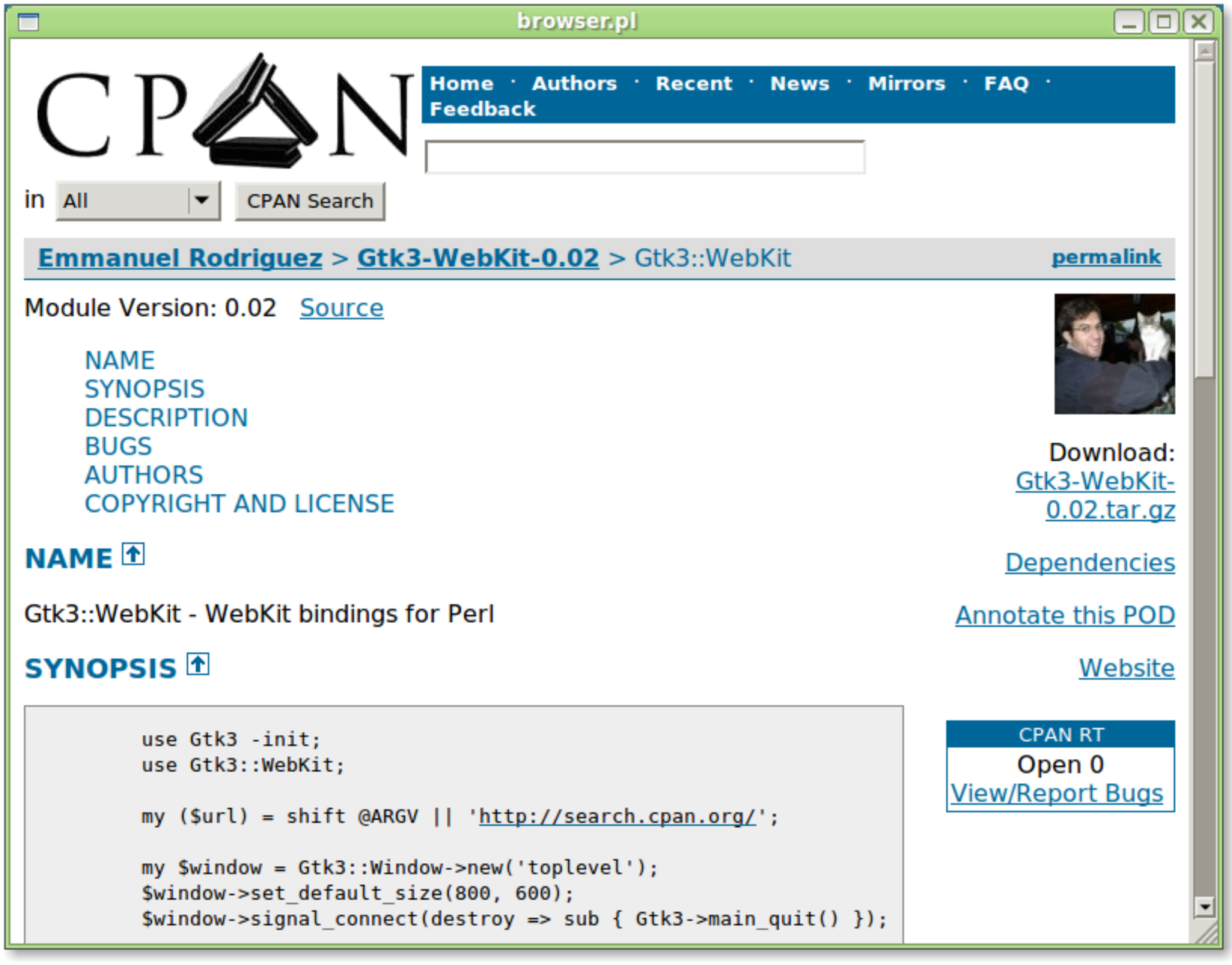
Code examples

Simple web browser

```
use Gtk3 -init;
use Gtk3::WebKit;

# Build a WebKit frame
my $view = Gtk3::WebKit::WebView->new();
$view->load_uri('http://search.cpan.org/perldoc?Gtk3::WebKit');

# Widget packing
my $window = Gtk3::Window->new('toplevel');
my $scrolls = Gtk3::ScrolledWindow->new();
$scrolls->add($view);
$window->add($scrolls);
$window->set_default_size(800, 600);
$window->show_all();
$window->signal_connect(destroy => sub { Gtk3->main_quit() });

# Main loop
Gtk3->main();
```

Code: browser.pl

Simple web browser (pic)

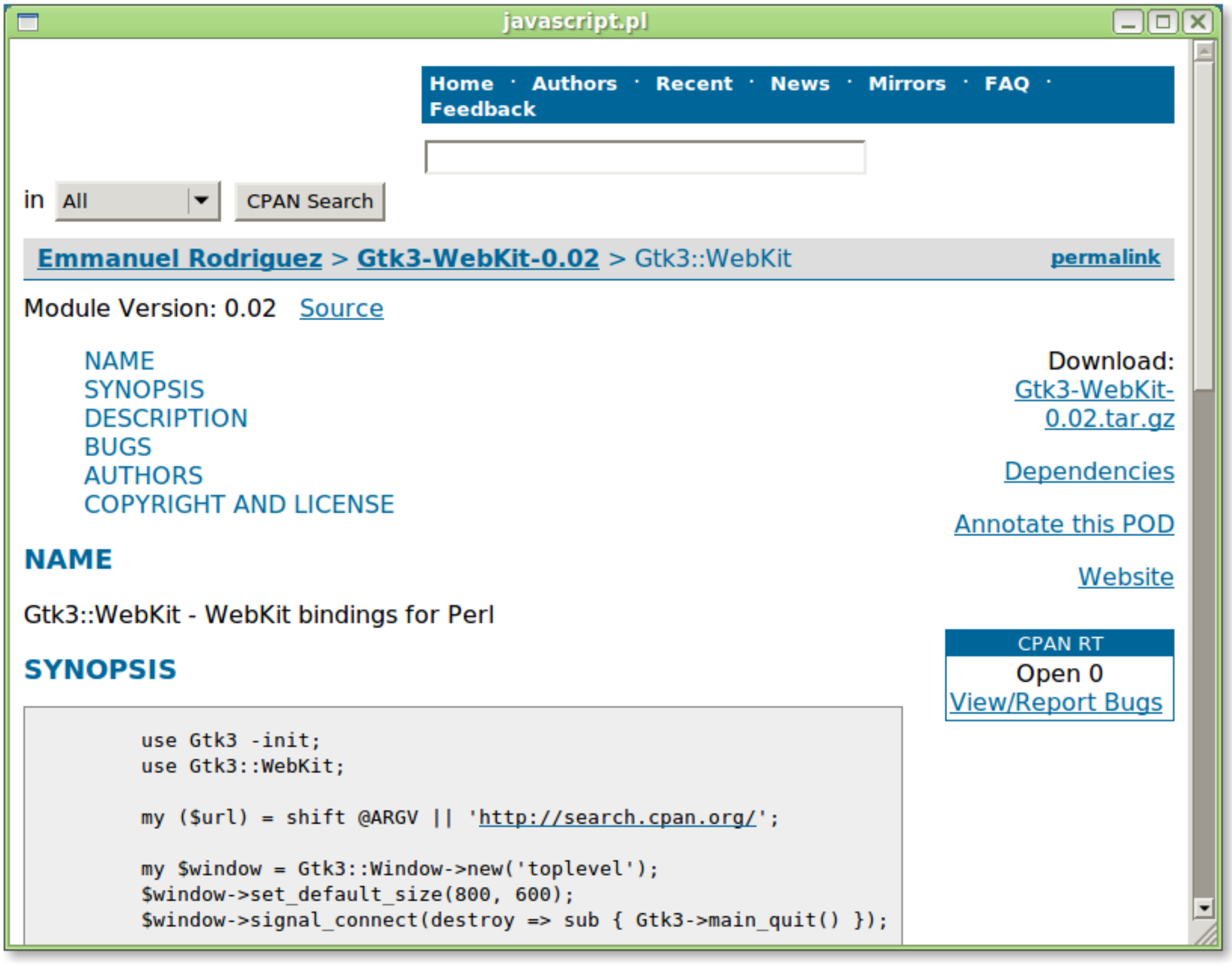


Execute JavaScript

```
# Execute a JavaScript command as soon as the page is loaded
$view->signal_connect('notify::load-status' => sub {

    # Wait for the page to be loaded
    return unless $view->get_uri and $view->get_load_status eq 'finished';

    # Execute jQuery (the page must have jQuery loaded already)
    $view->execute_script(q{
        $('img').hide();
    });
});
```

Code: javascript.pl

Execute JavaScript (pic)



PDF screenshot

Use Cairo for saving a page as PDF

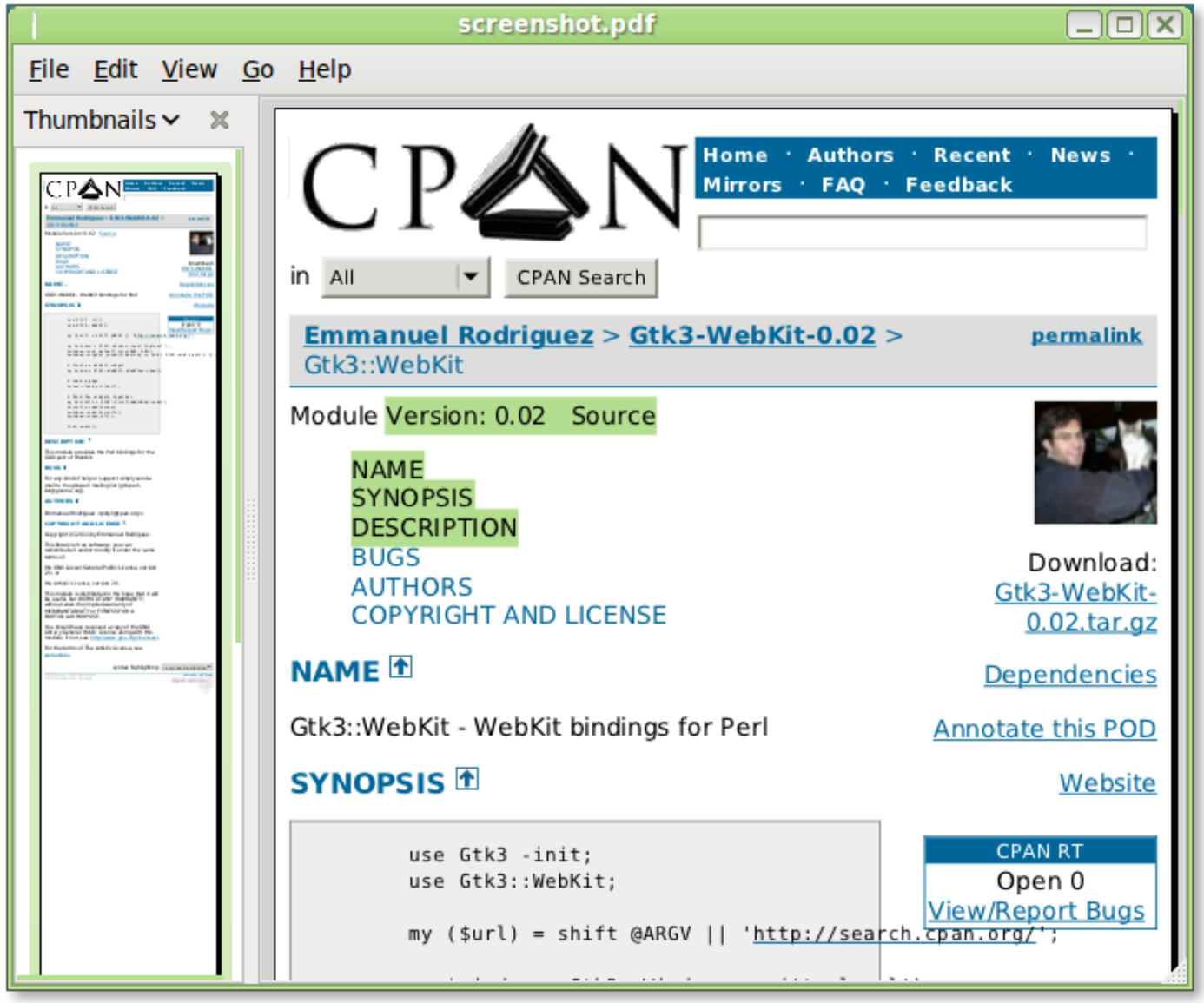
```
# With Gtk3 we can use offscreen rendering!
my $window = Gtk3::OffscreenWindow->new();
$window->add($view);
$window->show_all();

# Save the page as PDF file once loaded
$view->signal_connect('notify::load-status' => sub {
    return unless $view->get_uri and $view->get_load_status eq 'finished';

    # Use Cairo to grab a PDF (we can also use SVG, PostScript or PNG)
    use Cairo::GObject;
    my $width = $view->get_allocated_width;
    my $height = $view->get_allocated_height;
    my $surface = Cairo::PdfSurface->create("screenshot.pdf", $width, $height);
    my $cr = Cairo::Context->create($surface);
    $view->draw($cr);

    Gtk3->main_quit();
});
```

Code: pdf.pl

Run with: `xvfb-run --server-args="-screen 0 1024x768x24" pdf.pl`

PDF screenshot (pic)

Text is selectable!



Resource tracking

Show the download time of each resource

```
use HTTP::Soup;

# Get the session that's responsible for all HTTP access made by WebKit GTK
my $session = Gtk3::WebKit->get_default_session();

# Track all download requests
$session->signal_connect('request-started' => sub {
    my ($session, $message, $socket, $resources) = @_;

    # A new download request starts
    my $url = $message->get_uri->to_string(0);
    my $start = time;

    # Track the when the download finishes
    $message->signal_connect(finished => sub {
        my $elapsed = time - $start;
        my $status_code = $message->get('status-code') // 'N/A';
        print "$url $elapsed seconds, status code $status_code\n";
    });
});
```

Code: resources.pl

Nanny

Control which pages can be loaded or not (clicks ONLY)

```
use URI;
my $allowed_dest = URI->new($uri)->host_port;

# Intercept all web pages requests and reject all requests that will bring us
# to an external web site. This works only for the iframes and links that have
# been clicked by the user.
# *** JavaScript and CSS are not blocked! ***
$view->signal_connect('navigation-policy-decision-requested' => sub {
    my ($view, $frame, $request, $action, $decision) = @_;

    my $uri = $request->get_uri or return;
    return if $uri eq 'about:blank';

    # Accept the request only if we stay in the same site
    my $dest = URI->new($uri)->host_port;
    return if $dest eq $allowed_dest;

    # Reject all requests going to a different site
    print "Access denied $dest\n";
    $decision->ignore();
    return 1;
});
```

Code: nanny.pl

Über Nanny

Control which resoure can be loaded or not (works on everything)

```
use URI;
my $allowed_dest = URI->new($uri)->host_port;

# Block ANY resource that goes to an external site. This works for all resources.
# Even for resources that are built at runtime through JavaScript.
$view->signal_connect('resource-request-starting' => sub {
    my ($view, $frame, $resource, $request, $response) = @_;

    my $uri = $request->get_uri or return;
    return if $uri eq 'about:blank';

    my $dest = URI->new($uri)->host_port;
    return if $dest eq $allowed_dest or $dest =~ /\.(ultra)?bstatic\.com:/;

    # Block requests to an external URI, 'about:blank' is never downloaded.
    print "Access denied $dest\n";
    $request->set_uri('about:blank');
});
```

Code: uber-nanny.pl

DOM traversal

```
use Gtk3::WebKit ':node_types';

# Show which elements match the given CSS rules
find_elements_for_selectors(
    $view->get_dom_document->get_body,
    'div.featpostcard', 'td.c2name > a.hotelname'
);

sub find_elements_for_selectors {
    my ($node, @selectors) = @_;

    # Check if the current element matches the CSS rules
    if ($node->get_node_type == ELEMENT_NODE) {
        foreach my $selector (@selectors) {
            next unless $node->webkit_matches_selector($selector);
            printf "%s matches %s\n", $node->get_tag_name, $selector;
        }
    }

    # Recurse through the child nodes
    my $child_nodes = $node->get_child_nodes;
    my $length = $child_nodes->get_length;
    for (my $i = 0; $i < $length; ++$i) {
        my $child = $child_nodes->item($i);
        find_elements_for_selectors($child, @selectors);
    }
}
```

Code: dom.pl

XPath

Find all elements that define CSS rules (<style> and <link>)

```
use Gtk3::WebKit ':xpath_results';

# XPath to find 'style' and 'link stylesheet'
my $doc = $view->get_dom_document;
my $xpath_results = $doc->evaluate(
    '//style | //link[@rel="stylesheet" and @type="text/css" and @href]',
    $doc,
    $doc->create_ns_resolver($doc),
    ORDERED_NODE_SNAPSHOT_TYPE,
    undef
);

# Show the CSS
my $length = $xpath_results->get_snapshot_length;
for (my $i = 0; $i < $length; ++$i) {
    my $element = $xpath_results->snapshot_item($i);

    my $tag_name = $element->get_tag_name;
    if ($tag_name eq 'STYLE') {
        my $css_content = $element->get_first_child->get_text_content;
        print "CSS: $css_content\n";
    }
    elsif ($tag_name eq 'LINK')  {
        my $href = $element->get_attribute('href');
        print "LINK: $href\n";
    }
}
```

Code: xpath.pl

Real life examples

Find more scripts in github: https://github.com/potyl/Webkit

Some of the scripts

- s5pdf - save a S5 presentation to PDF
- deck2pdf - save a Deck.JS presentation to PDF
- screenshot.pl - screenshot a page or section as pdf, ps, png or svg
- css-rules-usage.pl - report CSS rules that are declared but not used
- nanny.pl - very simple parental control
- downloads.pl - track the downloads for one page
- har.pl - generate HTTP Archive (HAR) files

This slides

- HTML - https://github.com/potyl/Talk-WebKit-Perl/
- PDF - https://github.com/potyl/Talk-WebKit-Perl/blob/downloads/webkit-perl.pdf

Questions ?