

Integrating **Koha** with **RFID** system



Dobrica Pavlinušić

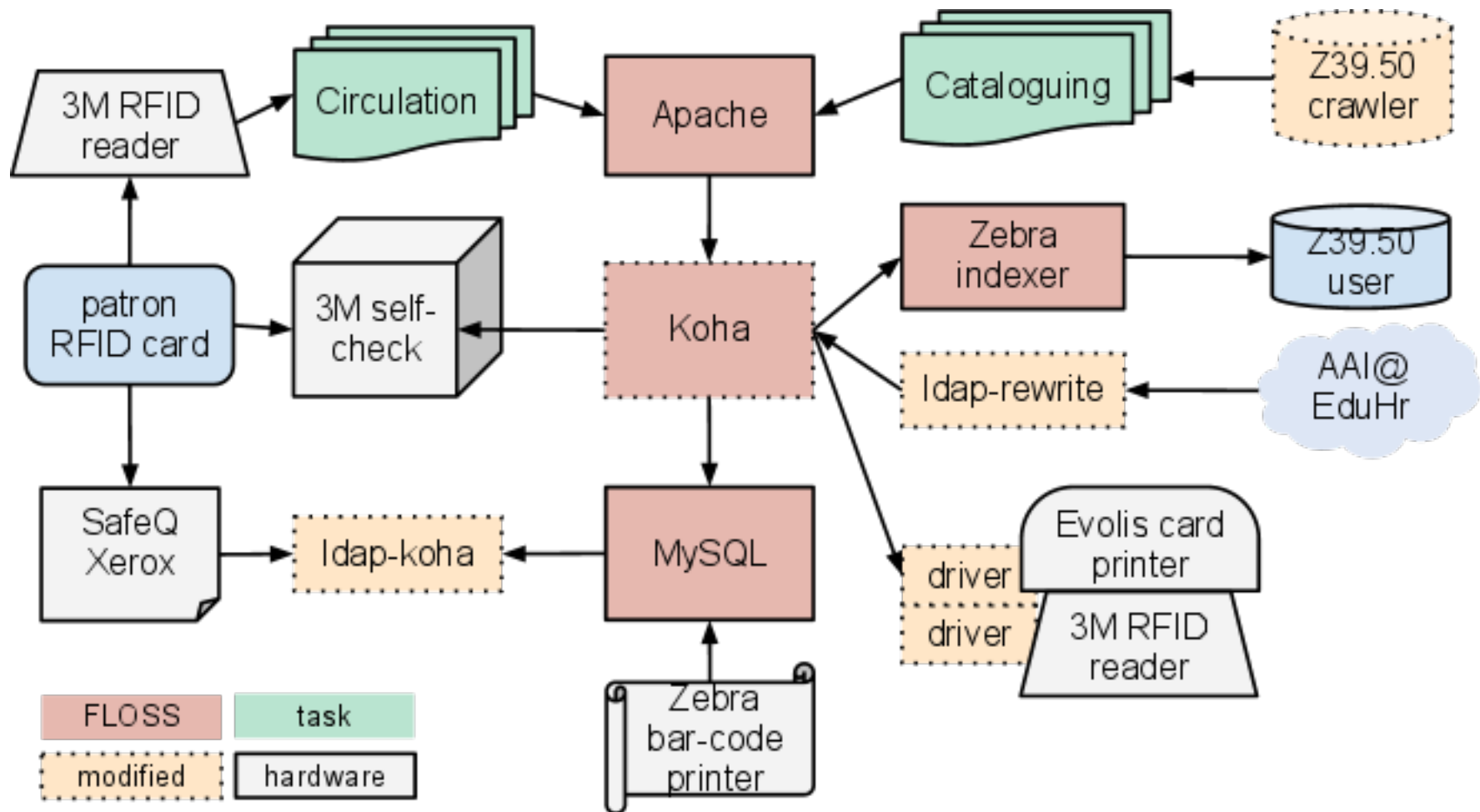
<http://blog.rot13.org>

Faculty of Humanities and Social Sciences,
University of Zagreb, Croatia

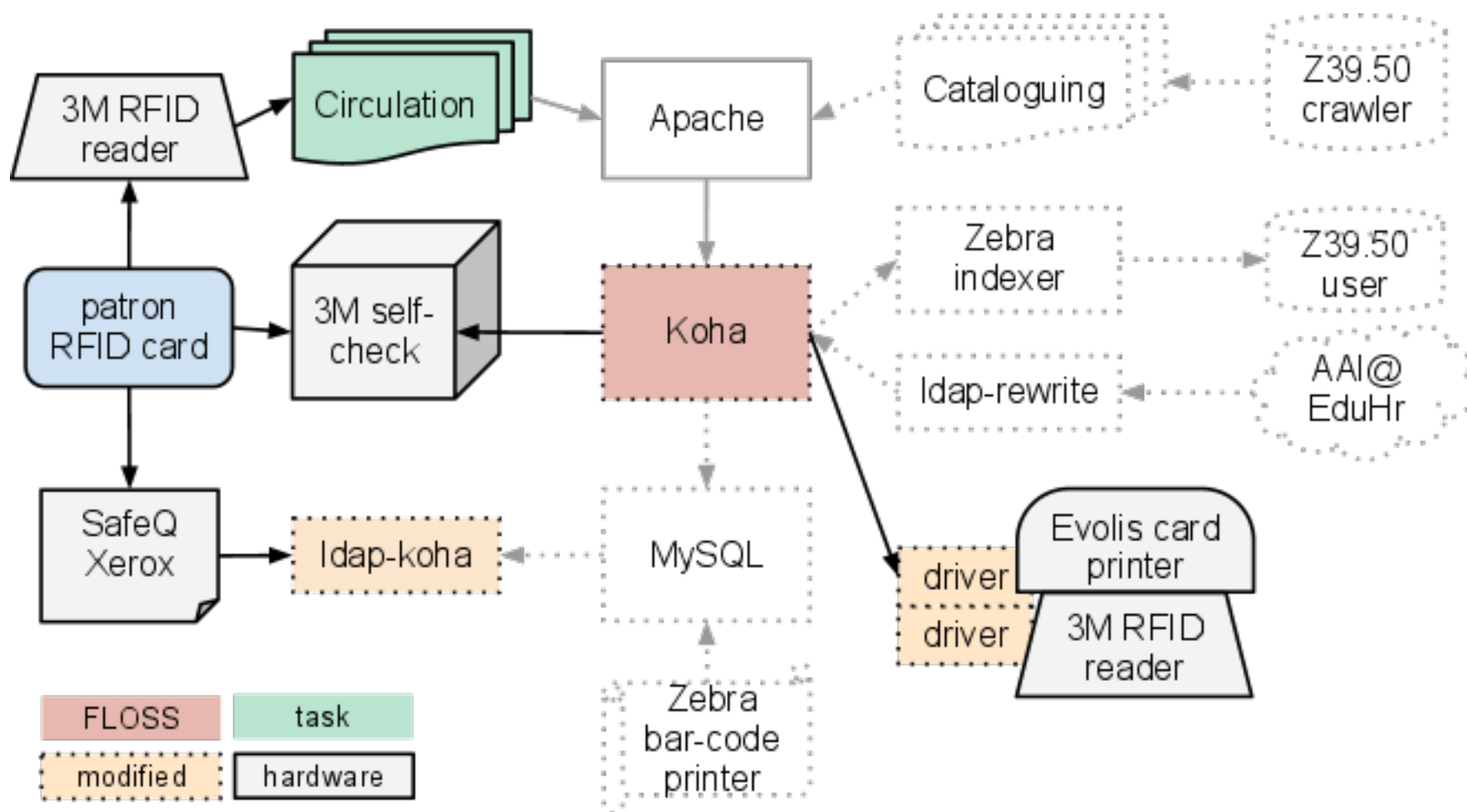


What can software geek expect from RFID?

Our Integrated Library System



Which parts are RFID related?

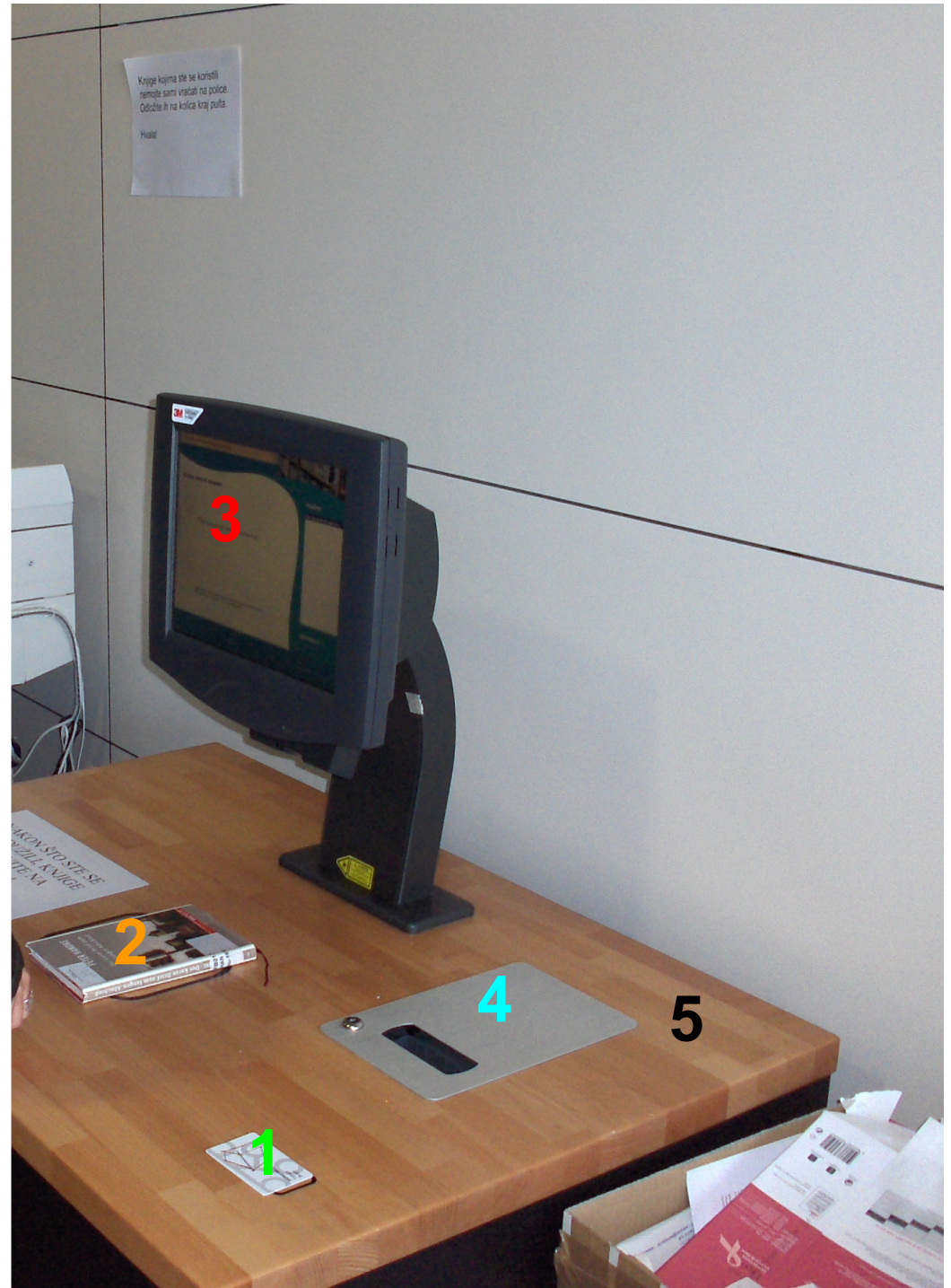




3M self-check station:

1. patron's card
 2. book
 3. touch-screen
 4. printer
 5. cabinet
- 2 RFID readers
 - Windows computer
 - TomCat
 - 3M Java Web app
 - Adobe Flash

SIP2 single-line protocol



Koha, SIP2 and self-checks

- 3M protocol for communication with self-check stations
- Koha is SIP2 server for self-checks
- single-line protocol with CR/LF endings (Java, UTF-8)
- 3M SIP2 (Windows) emulator is pain to work with

<https://github.com/dpavlin/Biblio-SIP2>

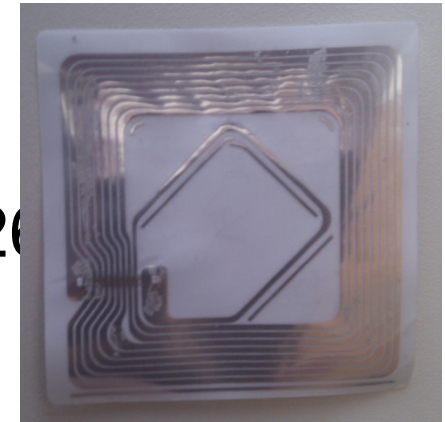
simple SIP2 protocol debugging and testing tool with:

- acs-proxy - capture communication between 3M SC and ACS server (Koha in this example)
- sc-emulator - send simple SC sessions to ACS from perl
- includes protocol pdf files for easy reference

3M RFID 501

http://saturn.ffzg.hr/rot13/index.cgi?hitchhikers_guide_to_rfid

- RFID 501: RFID Standards for Libraries
- SID - unique serial number E00401003123AA20
- 7 blocks * 4 bytes = 28 bytes



block	format	description
0	04 is 00 tt	i = 4bit item 1<=i<=s s = 4bit set size tt = 8bit type of item
1-4	16 * dd	barcode (16 chars max!)
5	bb bl ll ll	b = 12bit branch uint l = 20bit library uint
6	4 * cc	CCITT checksum

3M RFID 810 pads

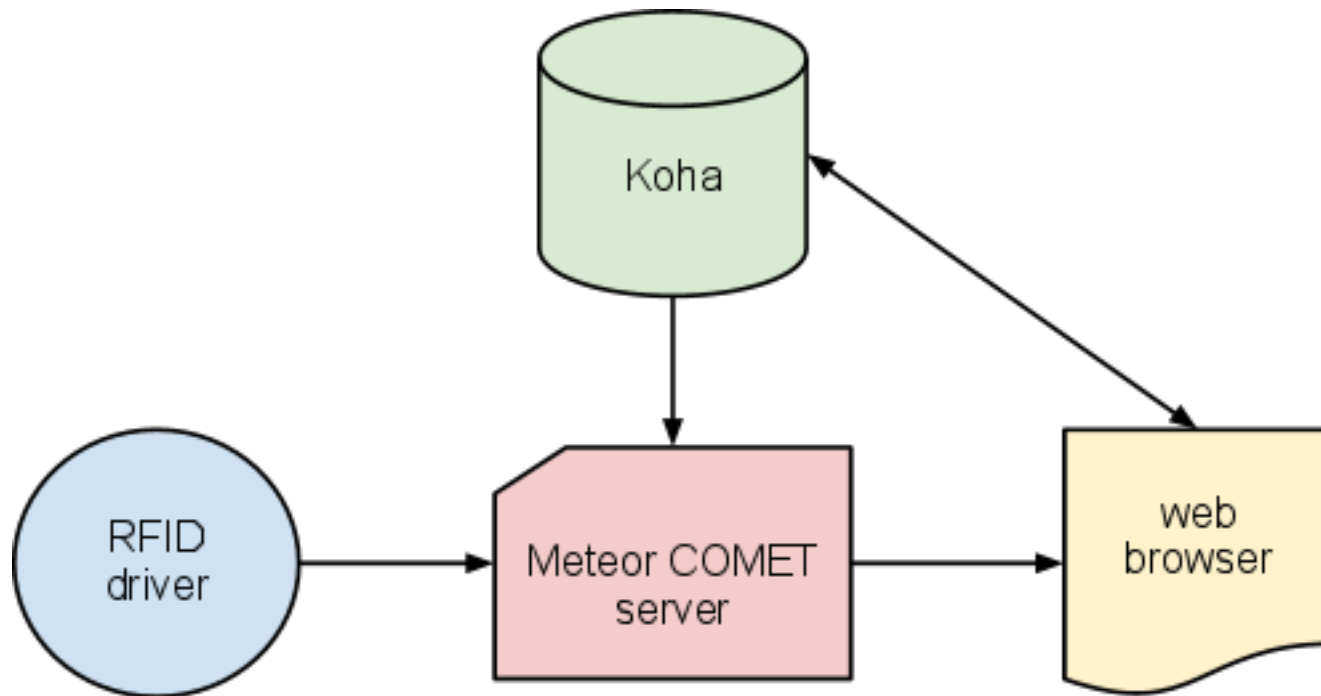
- 3M software for library staff
 - Visual Basic application from last century
 - Doesn't show SID from RFID cards
 - required for integration with Xerox SafeQ
 - other systems usually can't read RFID 501!
 - Maximum of 5 RFID chips readable
 - Copy/paste into Windows application based on browser title
- USB serial protocol



3M RFID protocol

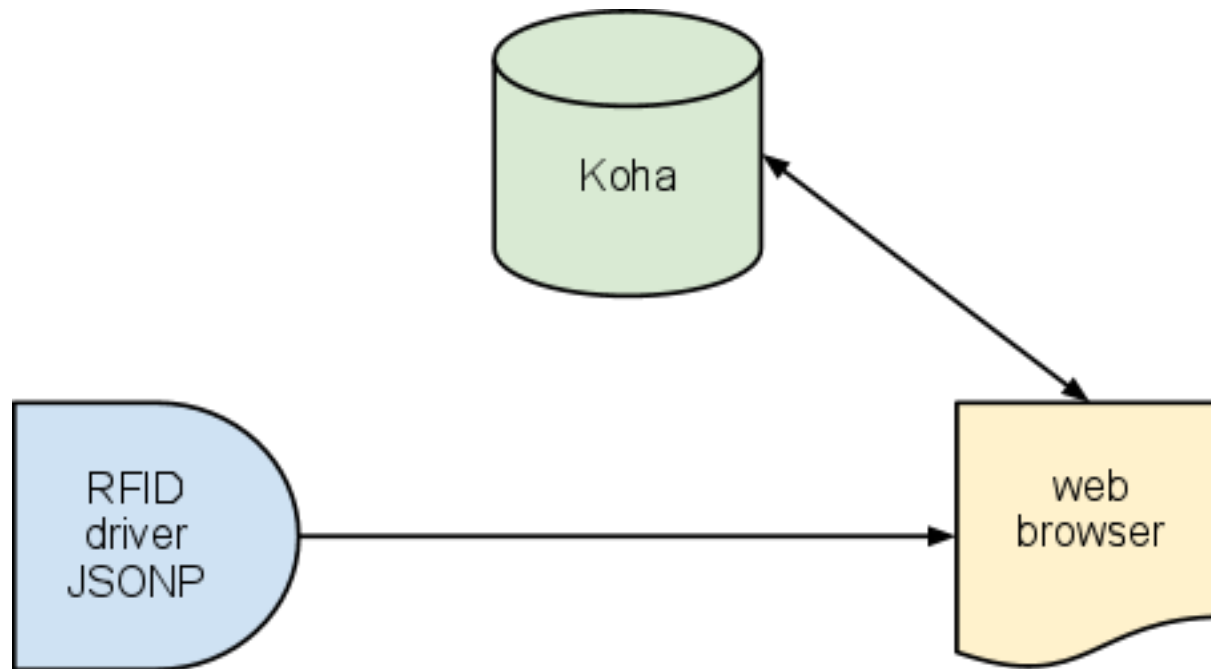
- Portmon for sniffing USB traffic
 - Windows running under KVM
- What is hardware capable of?
 - 25 RFID chips in neat arrangements
 - real capacity of RFID card (depending on type: sticker, card...)
 - how is security implemented (RFID doors, self-check)
- Protocol uses CCITT checksum
 - StackOverflow user selwyn solved my problem!
- October 5, 2008: first reverse engineered protocol working
- <https://github.com/dpavlin/Biblio-RFID>
- June 1, 2009: 3M released documentation for 3M RFID Reader Module 210
- **RFID 501 data format still undocumented!**

ETOOMUCH



Meteor Comet server: single point of failure

KISS: JSONP



browser pulls RFID reader using JSONP

```
library => 0,  
set => 0,  
total => 0,  
type => 0,  
u1 => 0,  
u2 => 0,  
# tags: (  
  "E00401001F779671",  
  "E00401001F776304",  
  "E00401001F77800C",  
  "E00401001F7778EE",  
)  
3 tags in range: E00401001F779671,E00401001F776304,E00401001F77  
78EE  
  
removed tag E00401001F77800C with data ("\\0" x 64)  
# tags: ("E00401001F779671", "E00401001F776304", "E00401001F777  
8EE")  
1 tags in range: E00401001F7778EE  
  
removed tag E00401001F779671 with data ("\\0" x 64)  
removed tag E00401001F776304 with data ("\\0" x 64)  
# tags: "E00401001F7778EE"  
[]
```



empty
card,
let's
program
it!

<http://www.youtube.com/watch?v=bViBrGP-TG0>

REST

- Scan

GET <http://localhost:9000/scan?callback=foo>

```
foo({"time":1265896293,"tags":[{"sid":"E00401001F778B5D",  
"custom":0,"content":"","library":0,"branch":0,"total":0,  
"u1":0,"u2":0,"security":"00","type":0,"set":0}]})
```

- Program

GET <http://localhost:9000/program?E00401001F778B5D=201002120042>
302 Location

GET <http://localhost:9000/program?E00401001F778B5D=blank>

Source code: <https://github.com/dpavlin/Biblio-RFID>

REST

- Security

- check-in, protect chip (door beep!)
- check-out, unprotect chip
- automatic on programming

GET http://localhost:9000/secure?E00401001F778B5D=DA
302 Location

GET http://localhost:9000/secure?E00401001F778B5D=D7
302 Location

GET http://localhost:9000/secure.js?E00401001F778B5D=DA
JSONP

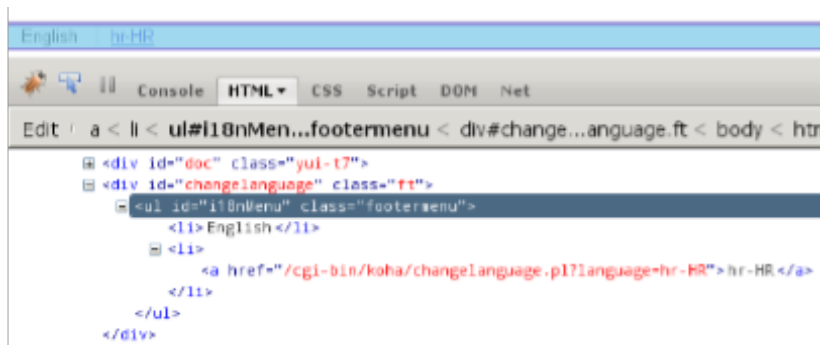
GET http://localhost:9000/secure.js?E00401001F778B5D=D7
JSONP

HTTP tweaks

- Etag: visible-E00401001F77478C
 - Not supported in our jQuery 1.2.3 until <http://github.com/jquery/jquery/commit/28ab4d32247943e1ae3409b23fe69303df0bc9eb>
 - RFID driver zna **promjene** pa bi ih mogao gurnuti klijentu za DOM update
- HTTP je state-less
 - Omogućava povezivanje više klijenata istovremeno (trenutno lokalni i Koha)

Koha modifications

- Find element to hook into



```
HTML
Edit | a < li < ul#i18nMenu...footermenu < div#change...anguague.ft < body < htr
  <div id="doc" class="yui-t7">
  <div id="changelanguage" class="ft">
    <ul id="i18nMenu" class="footer menu">
      <li>English</li>
      <li>
        <a href="/cgi-bin/koha/changeLanguage.pl?language=hr-HR">hr-HR</a>
      </li>
    </ul>
  </div>
```

- Append your data



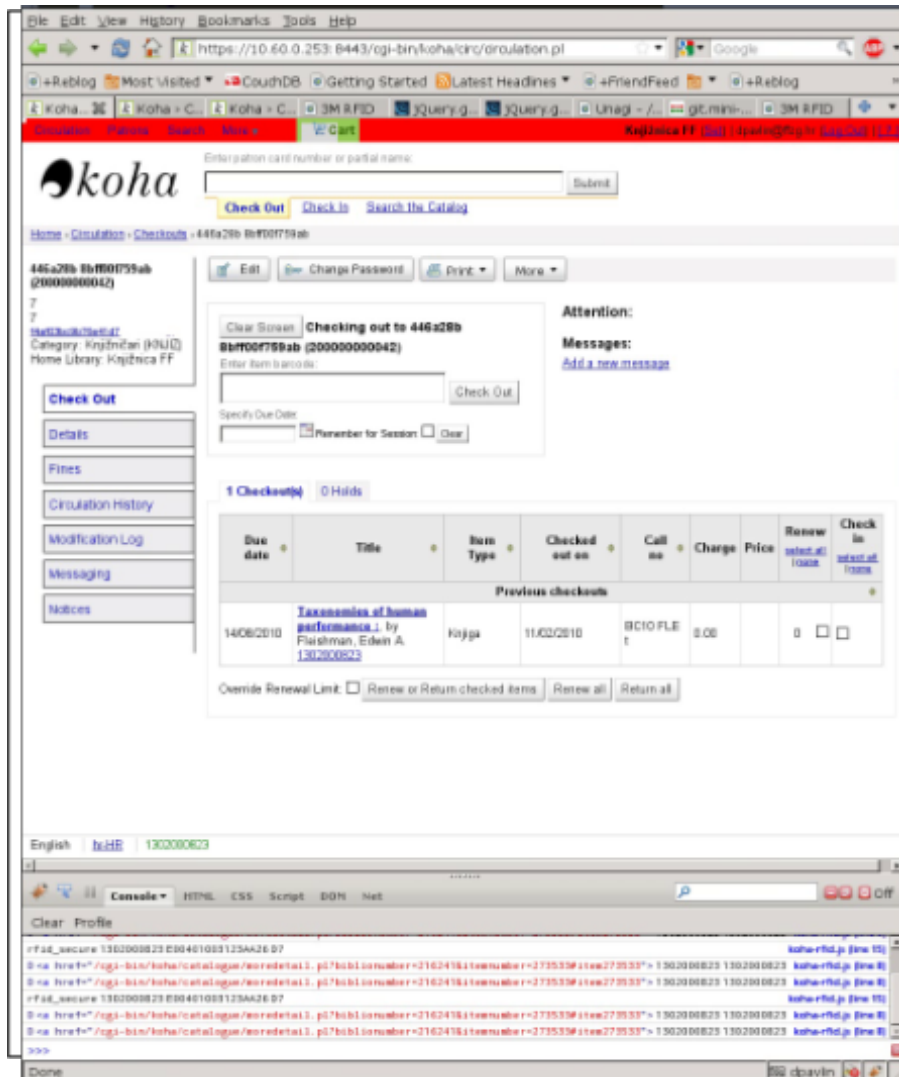
```
English | hr-HR | RFID status
Console HTML CSS Script DOM Net
Clear Profile
>>> $('ul#i18nMenu').append('<li>RFID status');
Object length= 7 @=ul#i18nMenu,footermenu prevObject=Object
>>>
```

- Minimal Koha modifications
intranetuserjs

```
$.getScript('http://localhost:9000/examples/koha-rfid.js');
```

- 3K of JavaScript

Koha + RFID = RIA



- In-browser!
- JSONP /scan
- Custom form fill-in + submit
- Screen scraping for security info
- No modifications to Koha!
- Single-origin policy is pain



RFID door beep on specified security byte

Printing on RFID cards

EVOLIS Dualys



- CUPS source code from EVOLIS: <http://www.evolis.com/eng/Drivers-Support/Product-support/Dualys-3>
- `rastertoevolis` segfaults with duplex options, always in color and then downgraded to back and white
- requirements:
 - pixel-exact output for black ribbon (K)
 - two-side printing
- <https://github.com/dpavlin/Printer-EVOLIS>
- Inkscape for SVG design

```
$ inkscape-render.pl card/ffzg-2010.svg 201008159999 Ime Prezime  
$ evolis-driver.pl out/201008159999.front.pbm out/201008159999.back.pbm \  
> evolis # or send directly to /dev/lp  
$ evolis-simulator.pl evolis ; qiv evolis*.pbm  
$ evolis-command.pl # REPL with printer with /search
```

Combine RFID and printer driver...



http://www.youtube.com/watch?v=KHC_DYP_6ic



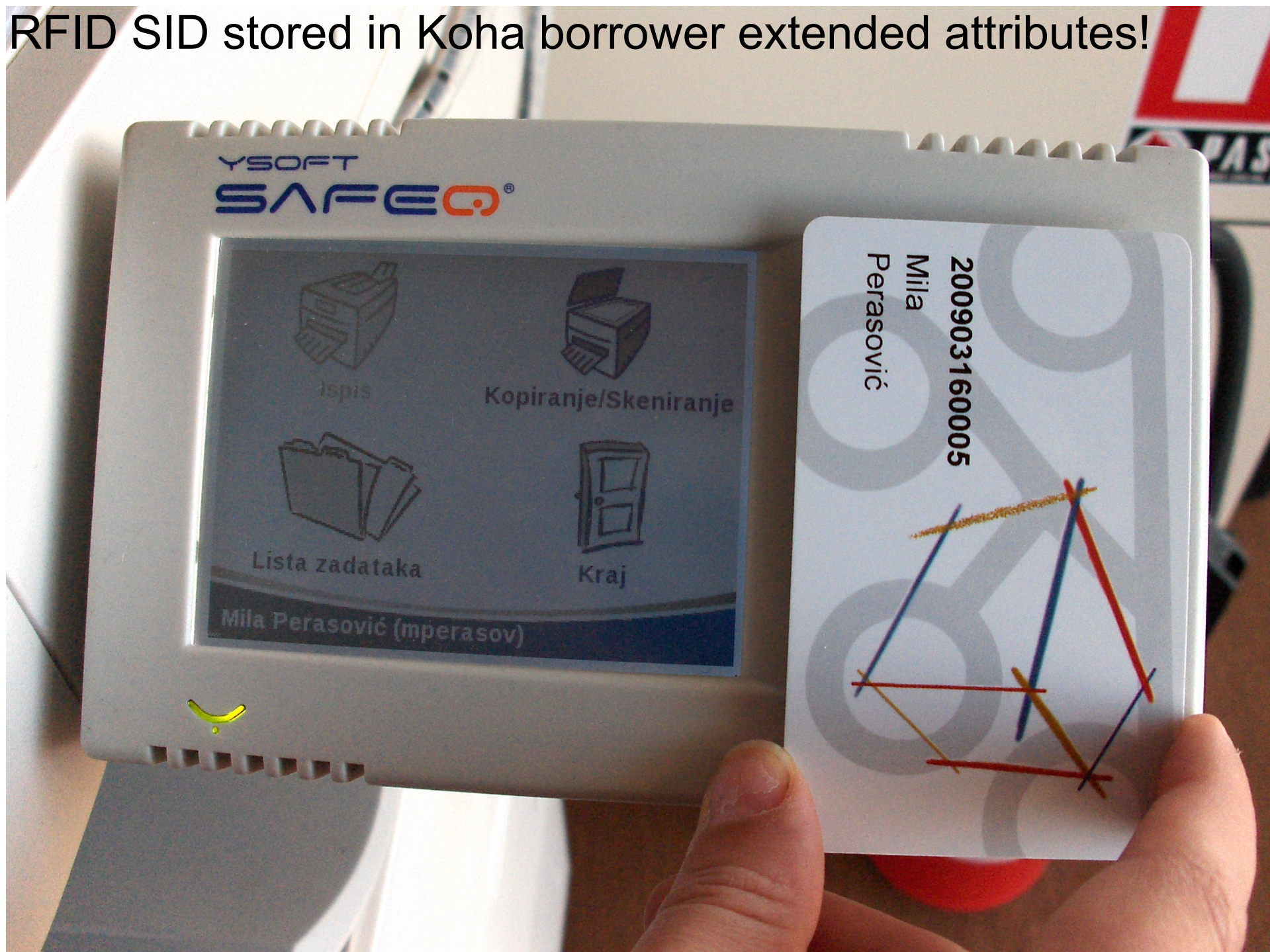
833 cards, 4.5 hours, 2 ribbons

Biblio::RFID

- <https://github.com/dpavlin/Biblio-RFID>
- Supported readers: 3M 810, CPRM02, librfid
- Make prototype
- If it looks too complex - **it's too complex!**
- **KISS** – keep it simple and stupid!
- Everything can be web-enabled!



RFID SID stored in Koha borrower extended attributes!



Virtual LDAP

ldap-koha: export Koha users to SafeQ as LDAP server

- pager=E00401001F77E111 LDAP search for RFID SID stored in Koha's extended patron's attributes
- one SQL file per objectClass
- rewrites LDAP filter into SQL where
- Koha groups as LDAP organizationalunit and group

ldap-rewrite: proxy between Koha and OpenLDAP server

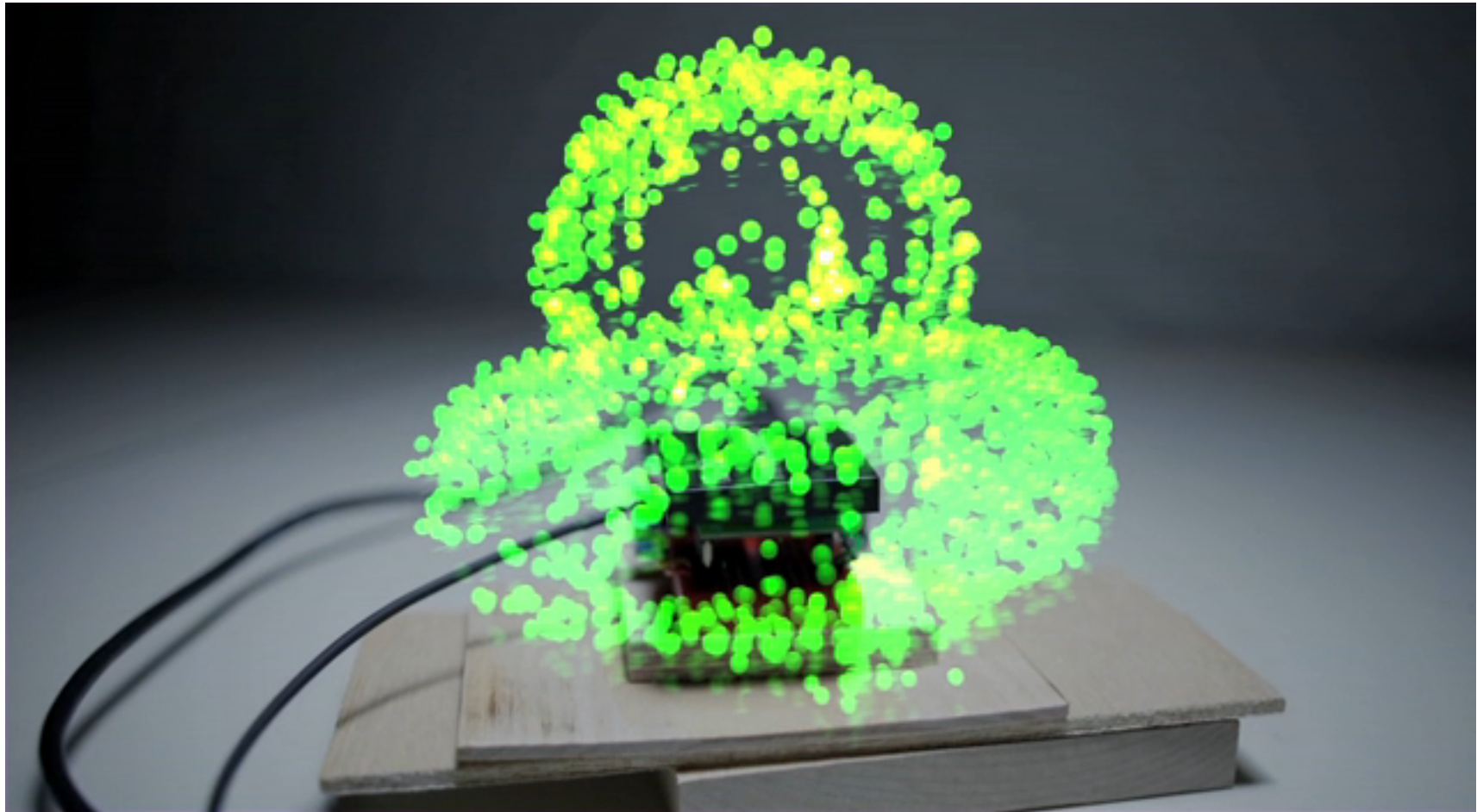
- bind dpavlin@ffzg.hr ⇒ uid=dpavlin,dc=ffzg,dc=hr
- augment LDAP attributes with static local YAML data
- unroll repeatable attributes in LDAP for easier Koha import

<http://blog.rot13.org/projects/virtual-ldap/>

Additional information

- [Portmon for Windows](#) (serial sniffer)
- Sources <https://github.com/dpavlin>
- [CCITT checksum question on StackOverflow](#)
- Related blog posts: <http://blog.rot13.org/rfid/>
- [Hitchhiker's guide to RFID](#)
- <https://github.com/dpavlin/Biblio-Z3950> web scraper





Immaterials: the ghost in the field by [Timo](http://vimeo.com/7022707)
<http://vimeo.com/7022707>

Questions?

42

Integrating Koha with RFID system

Back in 2008, we moved our libraries in new building equipped with 3M RFID hardware.

Since then I examined hardware a little and wrote Open Source driver for it which provide simple HTTP/JSONP interface for it. This allows adding RFID support to Koha's intranet using nothing more than JavaScript include file using jquery.

<https://github.com/dpavlin/Biblio-RFID/>

Is repository of source code which also provides nice event-driven API on top of 3M and few others RFID readers which we used with great success every year to print hundreds of new RFID cards for our users using related project:

<http://blog.rot13.org/2010/08/evolys-dualys-pixel-exact-printing-without-cups.html>

More information about by RFID projects is available at:

<http://blog.rot13.org/projects/rfid/>

Our Integrated Library System

