Registrant Credentials Security at .br

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Registration System

- .br registry

- NIR for Brazil - ASNs, IPv[46] blocks

Problem Size

3.1M domains
1.9K ASNs
100K IP blocks

2.7M objects administered directly through 1.4M system accounts (IDs)

500K domains (16%) administered through 60 registrars (EPP)

Increased as a high value target (or why we are such a low hanging fruit?)

Abril/2007 – PlayStation Network
http://en.wikipedia.org/wiki/PlayStation_Network_outage

Junho/2012 – LinkedIn
http://en.wikipedia.org/wiki/2012_LinkedIn_hack

Outubro/2012 – google.ie Hijack/ nic.pe compromise
http://www.lucidity.ie/blog/166-google-ie-hijacked-not-hacked
http://www.cyberwarnews.info/2012/10/20/peru-pe-domain-service-hacked-96000-credentials-leaked/

Novembro/2012 – [google|yahoo|apple|microsoft].[ro|pk] Hijack
http://www.computerworld.com/s/article/9234089/
Attackers_hijack_the_.ro_domains_of_Google_Microsoft_Yahoo_others
http://www.theverge.com/2012/11/24/3685334/pakistani-domains-hacked

Novembro/2012 – nic.gp compromise
http://thehackernews.com/2012/11/guadeloupe-national-domain-registrar.html

Credentials Storage

Clear text
- abcd1234

Cryptographic Hash
- 61ee8b5601a84d5154387578466c8998848ba089
- Trivial to explore with pre-computed dictionary on these days Laptop CPUs (2M hashs/s)

Salted Hash
- xyzh-7be44f960a49c4f7f4ad862be96904dbb91b20b7
- Possible to explore with GPUs (350G hashs/s)
- Reports on 90% of the Linkedin hashs

Salted Adaptative Hash
- 010d9f3283ff3dff-86cbd8fced5f199d2afc0d4aba165041c0fa98b5
- Difficult to implement using GPUs – (PBKDF2, Bcrypt, Scrypt)

Encrypted Salted Adaptative Hash
- Symmetrical Key, OFB mode, Good IV

Great care needs to be taken on the choice of adaptative hash functions for public authentication services. Some of them are very expensive and could be turned in a DOS vector.

Promote good passwords practices. Passphrases of moderated sizes make brute force attacks impracticable
http://cartilha.cert.br/senhas/

Two Factor Authentication – 2FA

Something you know

- Password/Passphrase

Something you have

- Token with OTPs

Unencumbered available technology - IETF

- HOTP/TOTP (RFCs 4226 and 6238)
- HMAC – Hash Based Message Authentication Code
- Shared Key
- HOTP sequential number
- TOTP sequential number based on a temporal interval
  - Origin (epoch 1/1/1970), intervals of 30s
- State of last sequential used numbers

Authentication Security "Module" - ASM

Total decoupling from the frontend systems

RestFull Interface

2FA	Password
PUT /otp/ GET /secret/<id> GET /otp/<id>/<auth> GET /htop/<id> DELETE /otp/<id>	PUT /pwd/<auth> GET /pwd/<id>/<auth> DELETE /pwd/<id>

After the provisioning no more direct access to shared secrets or pwd credentials

State stored on normal RDBMS

Shared Secrets derived using HMAC, a Master Secret and the <id>

Pwd credentials protected using a Symmetric Key

Master Secret and Symmetric Key protected by SSSS generated at initialization and required to activate the ASM

Rate Limit

All authentication operations rate limited

- Source Address
- ID

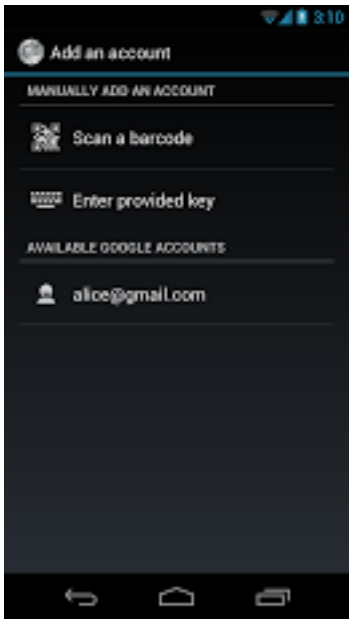
Using Token Bucket Algorithm

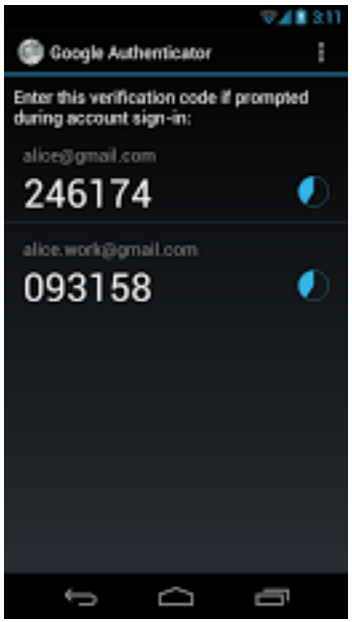
- http://en.wikipedia.org/wiki/Token_bucket

State stored on Redis

Token App – Google Authenticator

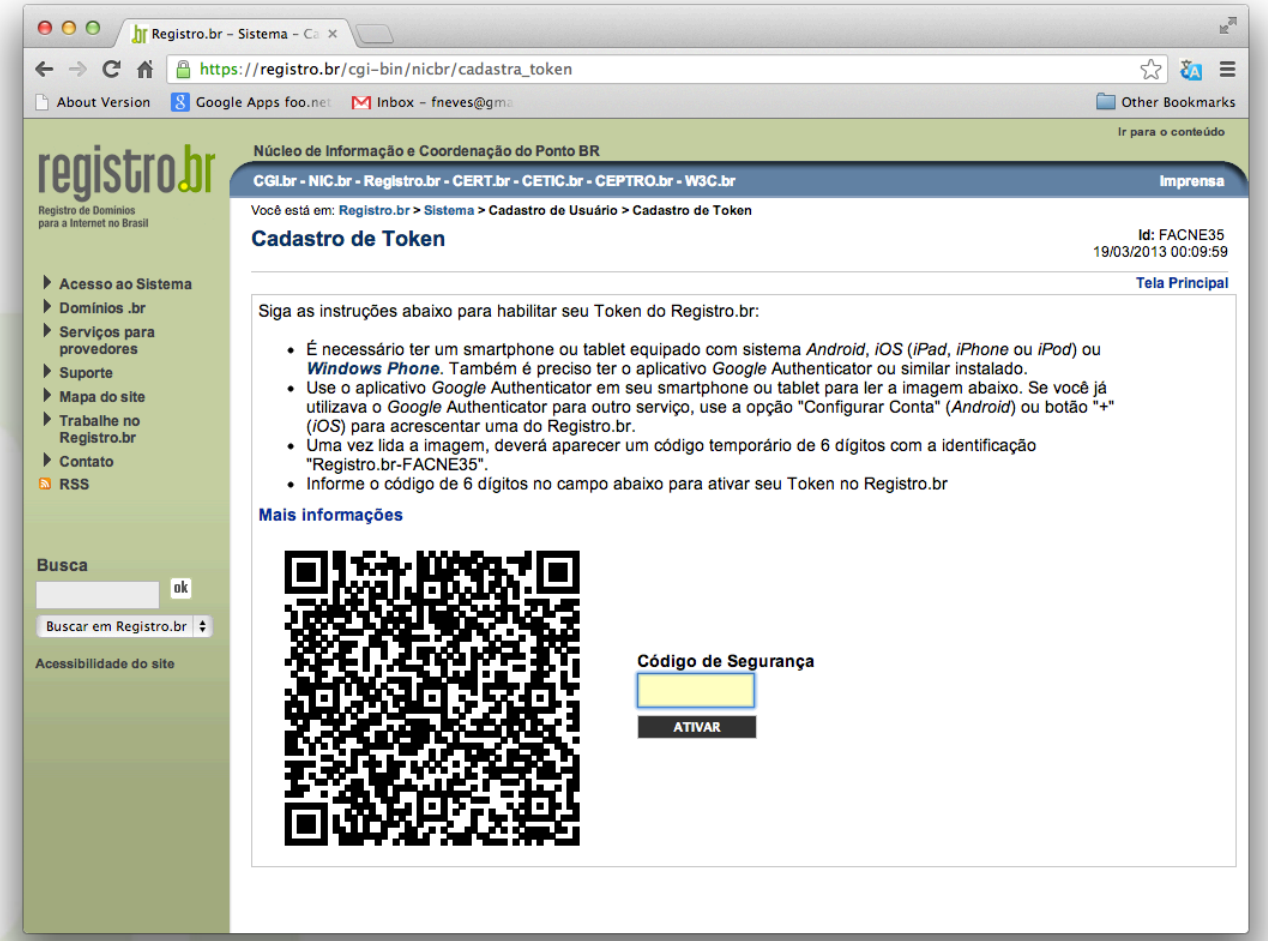
Open Source high quality implementation
- Android
- iOS
- Windows Phone (Authenticator)



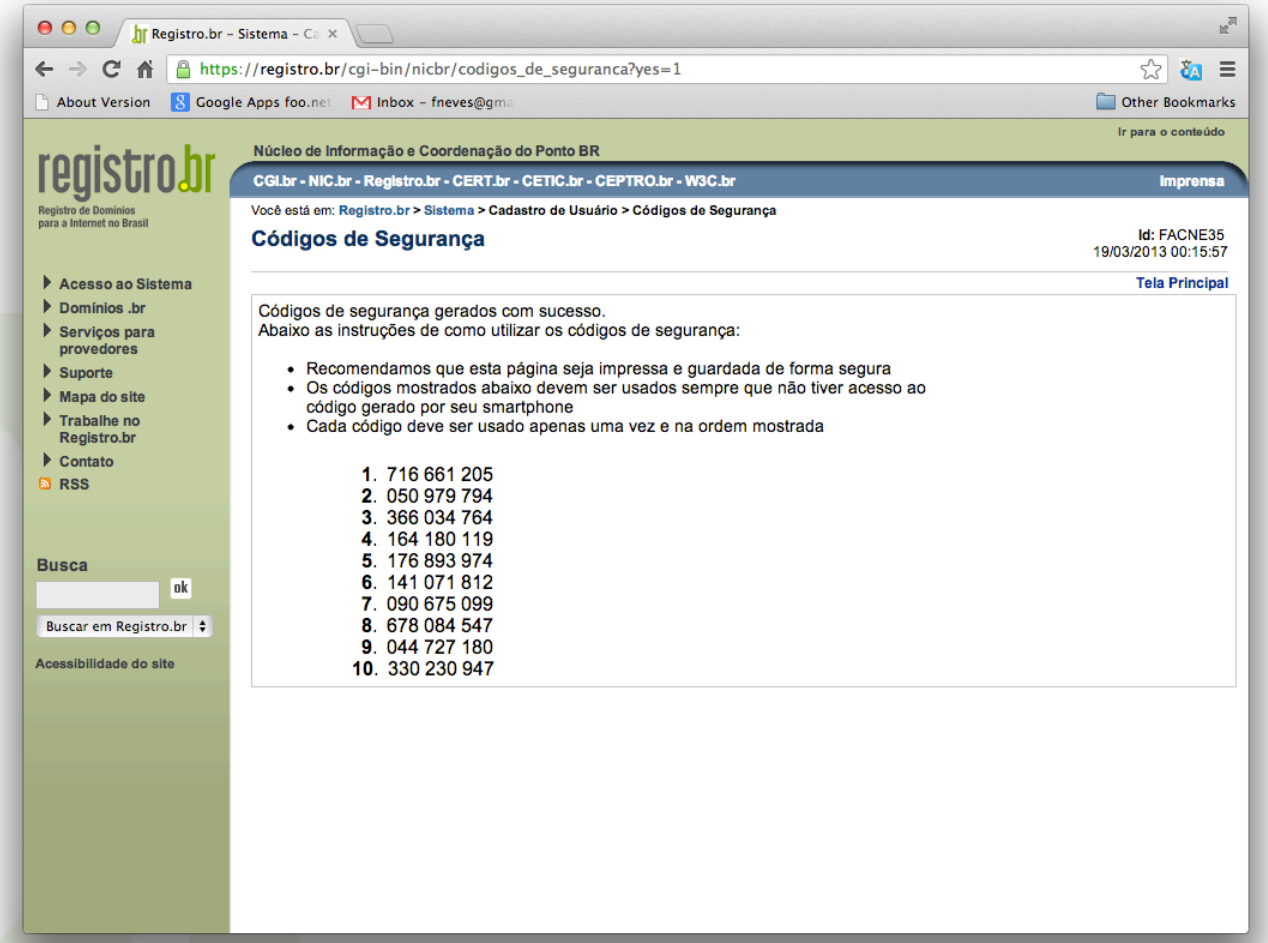


Provisioning of the Shared Secret

QR Code



Activation followed by HOTPs



Thanks

Comments/Questions?