The Case of the RSA FUCK-A-DUCK certificate

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N=pq

SSL certificates

- We scanned the Internet

SSL certificates

- We scanned the Internet
  - (It was awesome)

SSL certificates

- We scanned the Internet
  - (It was awesome)
    - Until amazon kicked us off

SSL certificates

- We scanned the Internet
  - (It was awesome)
    - Until amazon kicked us off
- 5,845,247.141592… certificates downloaded

SSL certificates

- Interesting results!


FACTOR ALL THE KEYS!

SSL certificates

- ~~Interesting results!~~
- Funny results!

"-----BEGIN RSA PRIVATE KEY-----" -openssl

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About 274,000 results (0.24 seconds)

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-----BEGIN RSA PRIVATE KEY - Pastebin.com - #1 paste tool since ...
pastebin.com/TbaeU93m
19 Apr 2010 – ... the difference. Copied. -----**BEGIN RSA PRIVATE KEY**-----.
MIICXwIBAAKBpenis1ePqHkVN9IKaGBESjV6zBrIsZc+XQYTtSlVa9R/4SAXoYpl ...

-----BEGIN RSA PRIVATE KEY - Pastebin.com - #1 paste tool since ...
pastebin.com/sC7bGw30
18 Apr 2010 – ... difference. Copied. -----**BEGIN RSA PRIVATE KEY**-----.
MIIEogIBAAKCAQEAvxBalhzKMewLvmIr1ptID1gO7EWGFyudzOAHLqm3+0+gpPbk ...

site:pastebin.com "-----BEGIN RSA PRIVATE KEY-----" - Posterous
cdevers.posterous.com/sitepastebincom-**begin-rsa-private-key**-google
20 Apr 2010 – Apr 19, 2010 ... -----**BEGIN RSA PRIVATE KEY**-----
MIICXwIBAAKBpenis1ePqHkVN9IKaGBESjV6zBrIsZc+ XQYTtSlVa9R/4SAXoYpl .

help/en/howto/sftp – Cyberduck
trac.cyberduck.ch/wiki/help/en/howto/sftp
Private keys containing a DSA or RSA private key in PEM format are supported (look for -----BEGIN DSA PRIVATE KEY----- or -----**BEGIN RSA PRIVATE KEY**----- ...

SSH access with a private RSA key [Archive] - VanDyke Software For…
forums.vandyke.com/archive/index.php/t-2185.html
2 Sep 2011 – -----**BEGIN RSA PRIVATE KEY**-----
MIIEogIBAAKCAQBujdbtxyIX4KaQPeTf5F/
aOSBwSpZN4MjTixU2Yq8JkipjMYpYwpNj1TODzRJf ...

Pastebin

```
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-----END RSA PRIVATE KEY-----
```

Pastebin

-----BEGIN RSA PRIVATE KEY-----

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AoGBAKDl8vuA9zUn2lTDddujAzBRp8ZEoJTxw7BVdLpZtgLWLuqPcXroyTkvBJC/

rbfPgYDdmgWc/lkpMufFe/-----BEGIN RSA PRIVATE KEY-----

FUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A

….

DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCKFUCK A DUCK5VKnb4

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-----END RSA PRIVATE KEY-----

Unfucking the duck

```
-----BEGIN RSA PRIVATE KEY-----
MIICXwIBAAKBpenis1ePqHkVN9IKaGBESjV6zBrIsZc+XQYTtSlVa9R/4SAXoYpI
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ipgts4FLFajgogOD+JxkkT1CXtEv7MqM6ihSxGVBD6UHN7I=
-----END RSA PRIVATE KEY-----
```

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-----BEGIN RSA PRIVATE KEY-----
MIICXwIBAAKBpenis1ePqHkVN9IKaGBESjV6zBrIsZc+XQYTtSlVa9R/4SAXoYpI
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7sJphlPEY8ofkwJj7K/ZKQJBAIc75HQi/Br1lRC4qPmF2vwYgwpyF9RbZWO56Eo7
ipgts4FLFajgogOD+JxkkT1CXtEv7MqM6ihSxGVBD6UHN7I=
-----END RSA PRIVATE KEY-----
```

Add padding

```
-----BEGIN RSA PRIVATE KEY-----
MIICXwIBAAKBpenis1ePqHkVN9IKaGBESjV6zBrIsZc+XQYTtSlVa9R/4SAXoYpI
upNrIjkCLd6DLDqfTO429xLDmYO4Ojzox7xiNcSMlBn8+TqTjf3TqAJmIOpgQVhJ
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AoGBAKDl8vuA9zUn2lTDddujAzBRp8ZEoJTxw7BVdLpZtgLWLuqPcXroyTkvBJC/
rbfPgYDdmgWc/lkpMufFe/5VKnb4AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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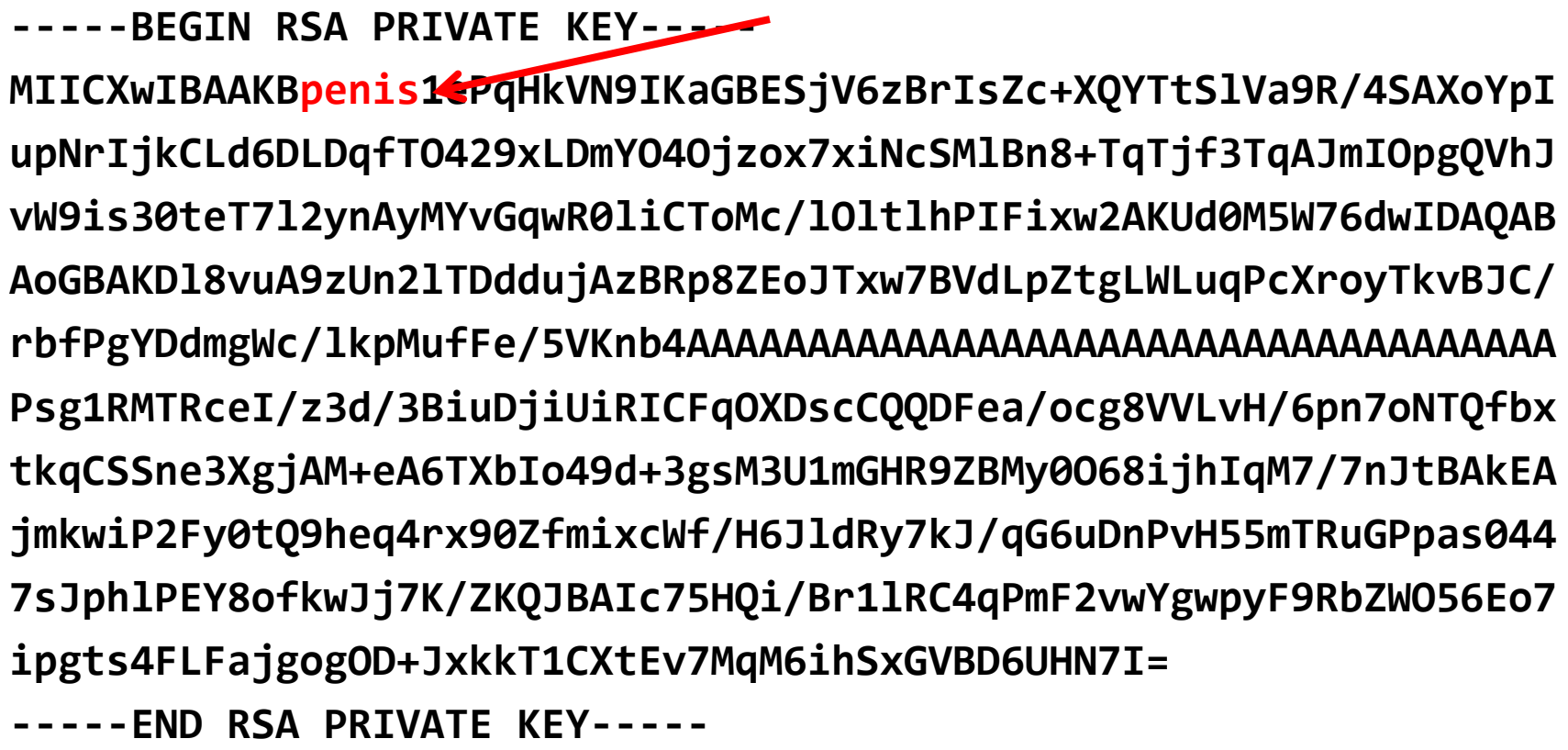
-----END RSA PRIVATE KEY-----
```

Unfucking the duck



Removing the private part

- “penis” -> gQDET
  - Length field (known)
  - ASN1 header field (known)
- “AAAAAAAAAAAA” -> ???
  - Half the bits of one of the primes (prime2, unknown)
    - prime2 = modulus / prime1

Huzzah!

```
-----BEGIN RSA PRIVATE KEY-----
MIICXwIBAAKBgQDET1ePqHkVN9IKaGBESjV6zBrIsZc+XQYTtSlVa9R/4SAXoYpI
upNrIjkCLd6DLDqfTO429xLDmYO4Ojzox7xiNcSMlBn8+TqTjf3TqAJmIOpgQVhJ
vW9is30teT7l2ynAyMYvGqwR0liCToMc/lOltlhPIFixw2AKUd0M5W76dwIDAQAB
AoGBAKDl8vuA9zUn2lTDddujAzBRp8ZEoJTxw7BVdLpZtgLWLuqPcXroyTkvBJC/
rbfPgYDdmgWc/lkpMufFe/TC+KgIDlWo50Pm/cwcChaM9nEINbFF1dqoA5gVxv6g
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ipgts4FLFajgogOD+JxkkT1CXtEv7MqM6ihSxGVBD6UHN7I=
-----END RSA PRIVATE KEY-----
```


https://cyberground.hu

Conclusion

- “FUCK-A-DUCK” is not good crypto
- Pastebin is not a secure cloud store
- Probably shouldn’t put your private key in a “secure” cloud store anyway
- Probably shouldn’t fuck a duck