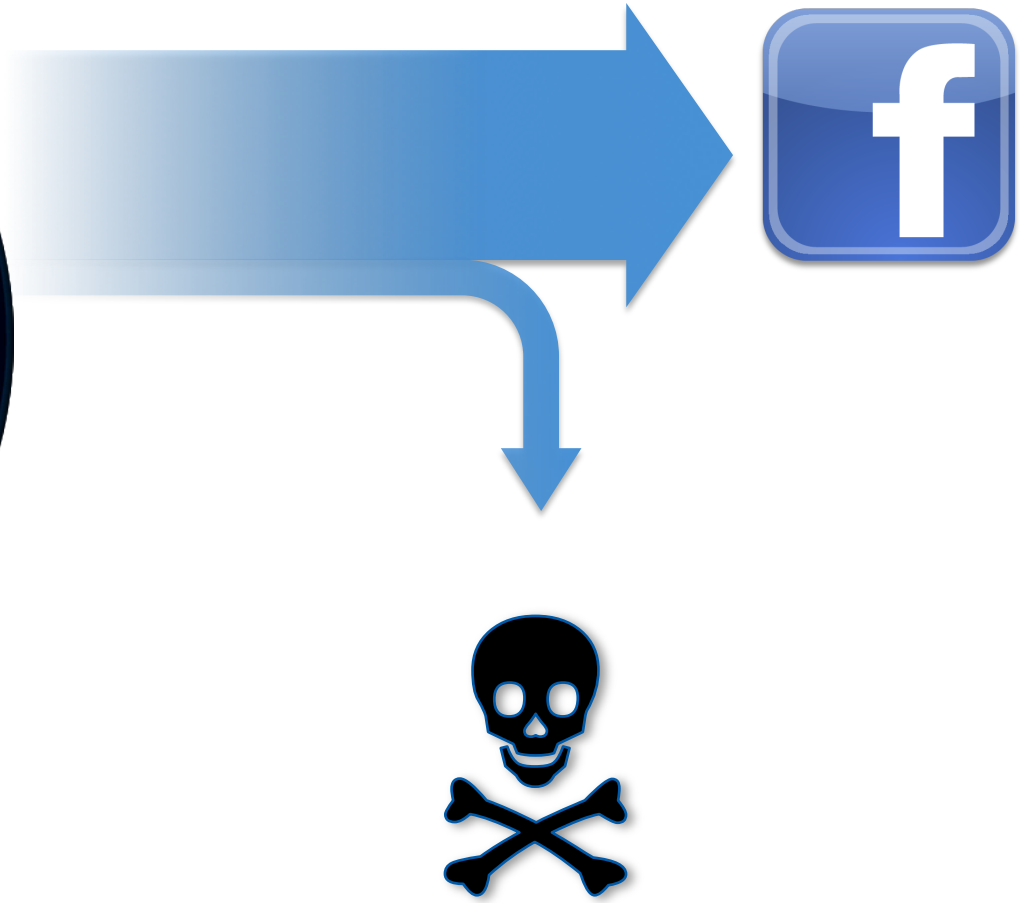
BITSQUATTING

DNS HIJACKING WITHOUT EXPLOITATION

ARTEM DINABURG
DEFCON 19

About Me

The Problem



Affected Platforms

PS3
PlayStation 3

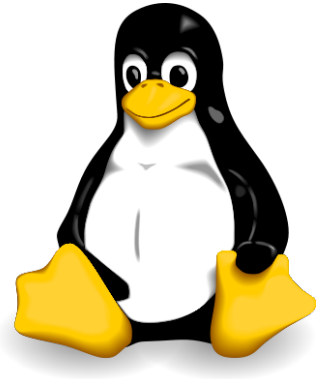
BlackBerry™

PSP
PlayStation®Portable

Microsoft®
Windows™

android

Windows phone



Wii™

symbian

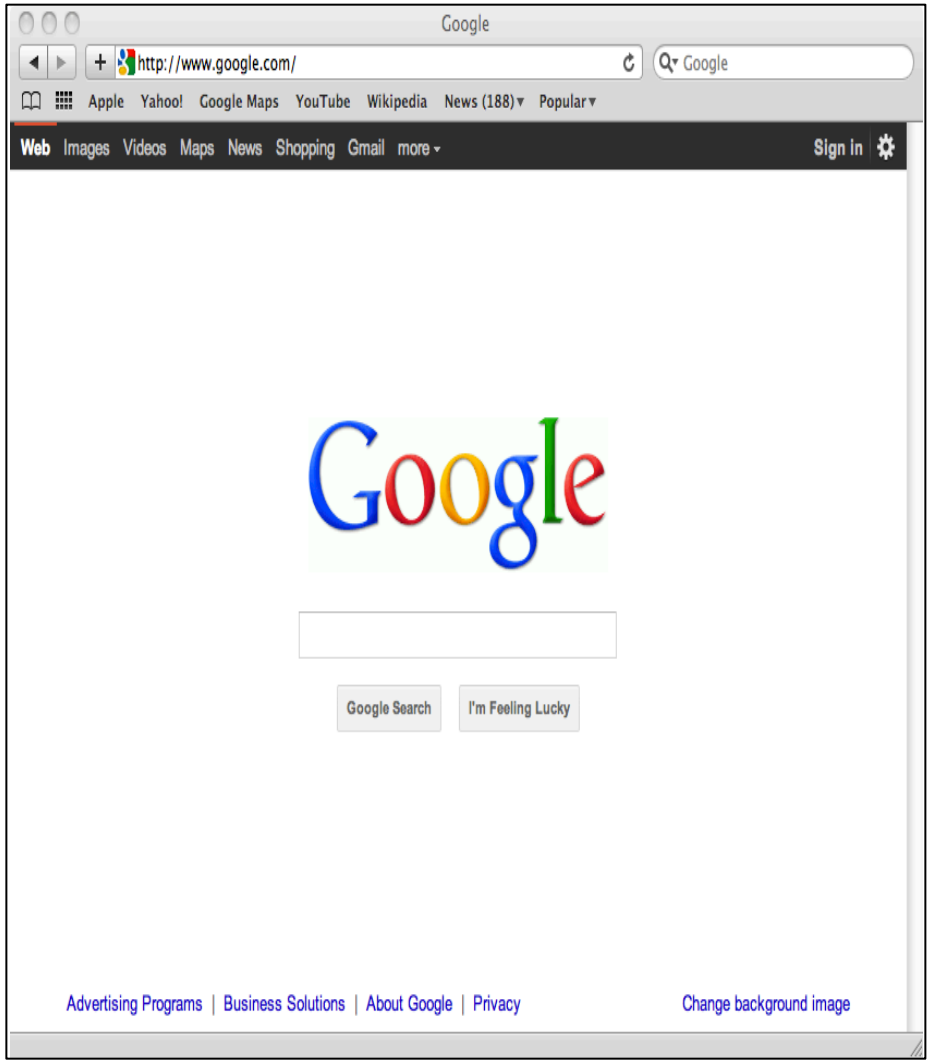

Low
Skill
brother
M
P 4
6 J 5
K E O 3
U ? D D S
K U L E T Y
2 2 I A C M 3

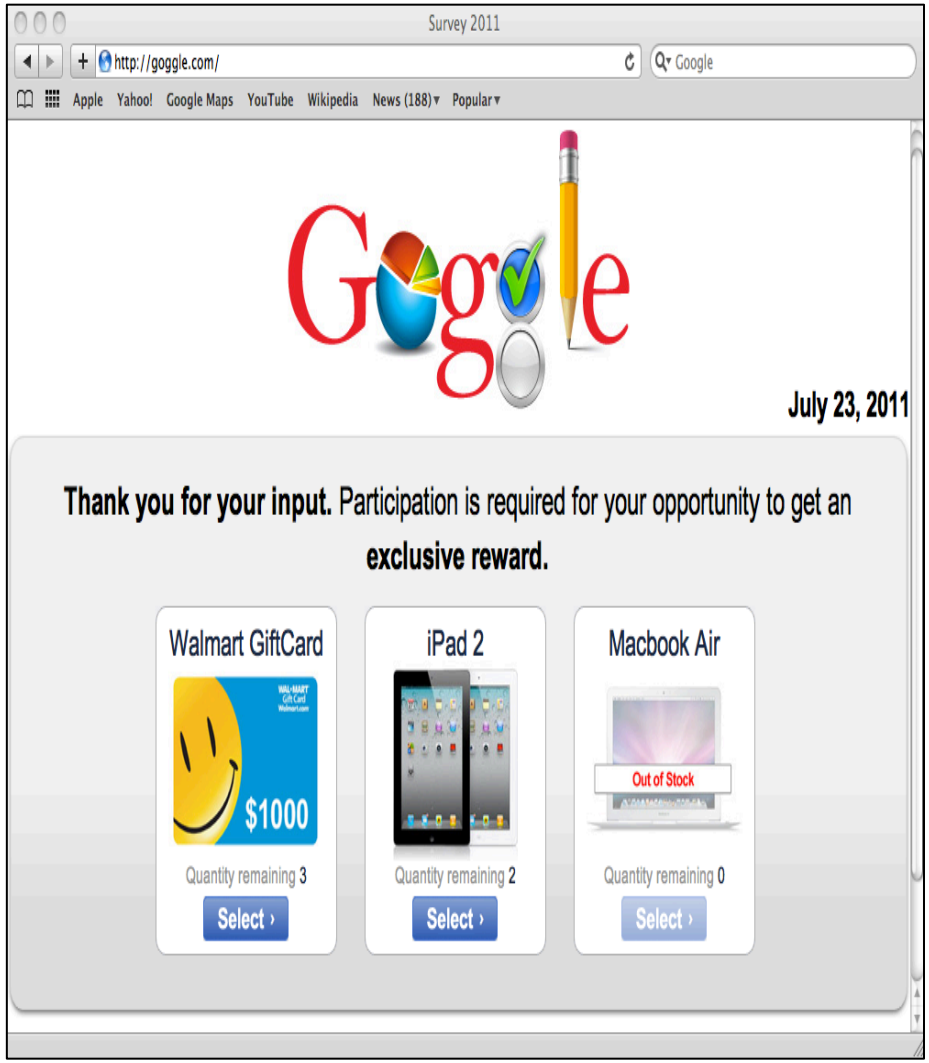

Cheap

Bitsquatting

Like typosquatting, but for bits

Typosquatting





There are

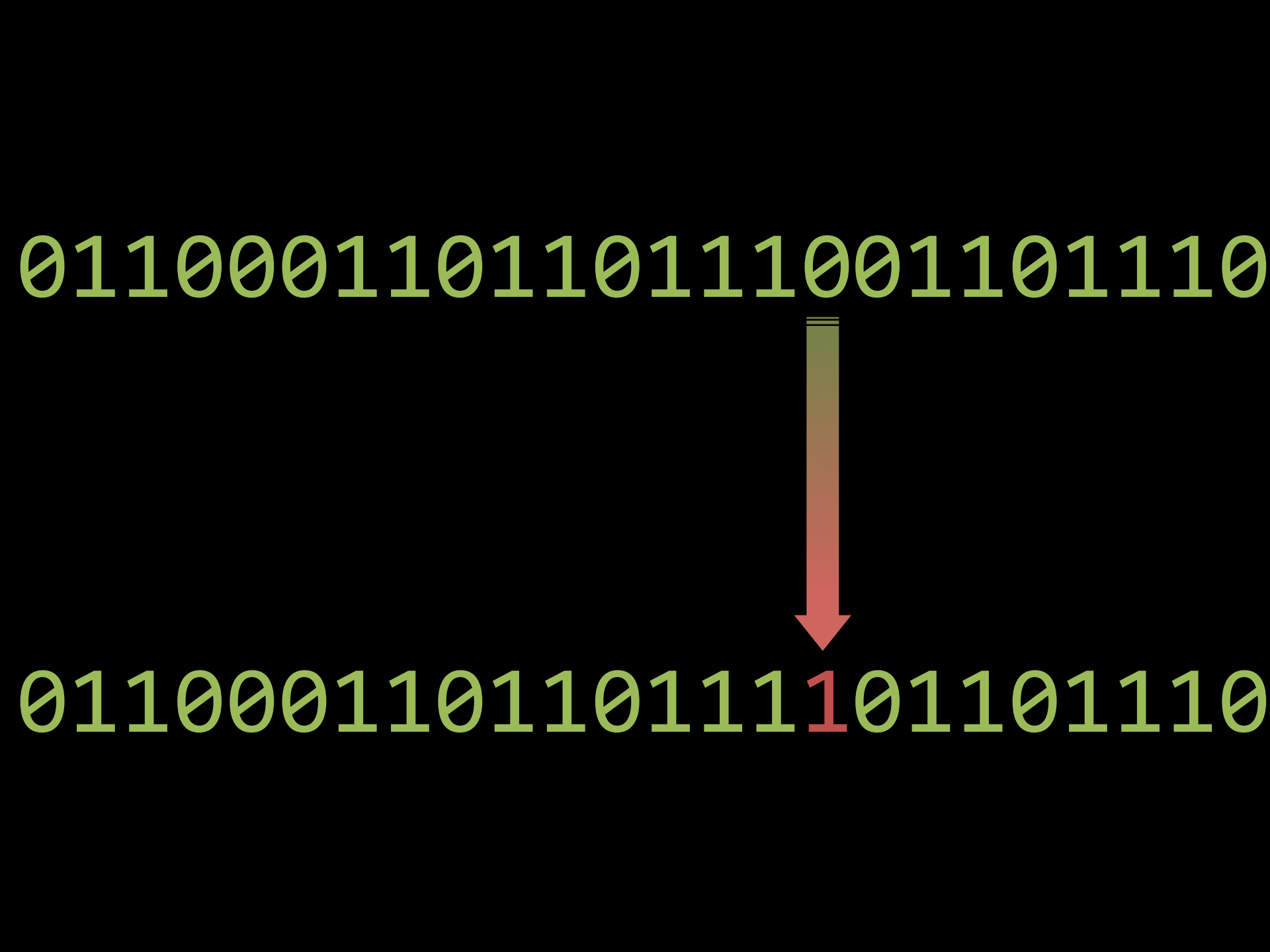
1500 daily DNS requests per person.

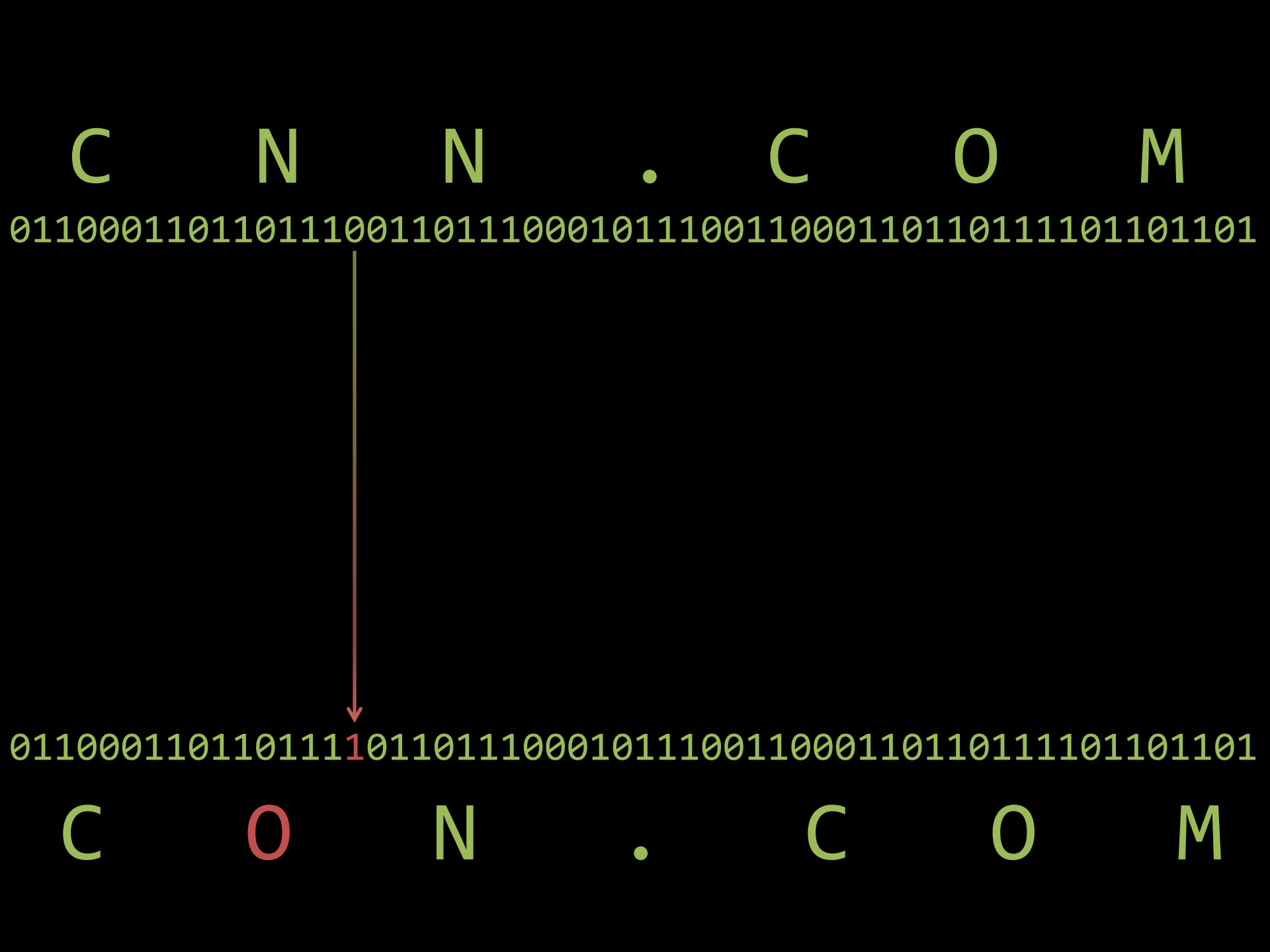
Humans type

3 of them.


HAL 9000


1
0
0
1

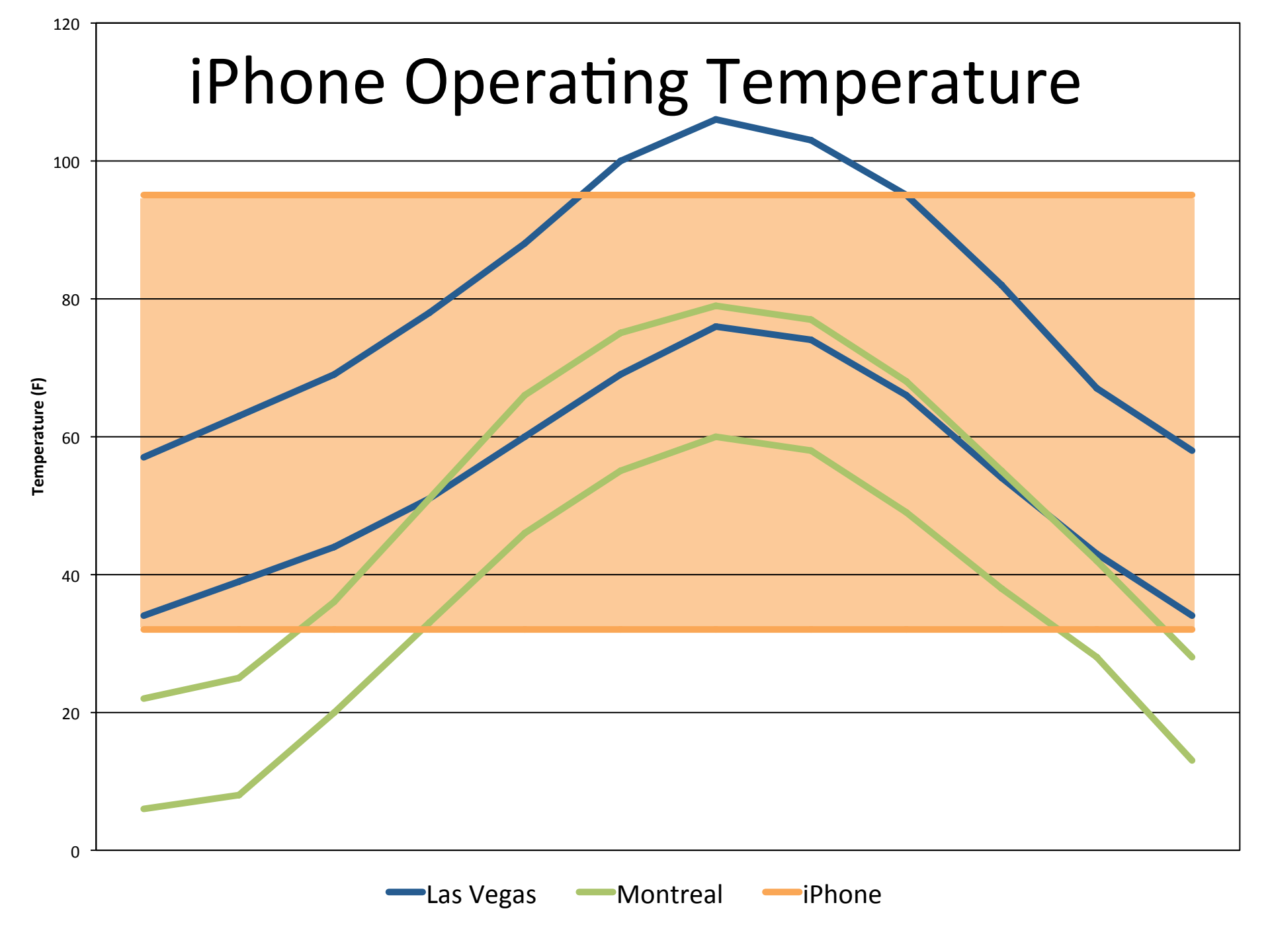

01100011011011100110111
01100011011011110110111


C N N . C O M
01100011011011100110111000101110011000110110111101101101
01100011011011110110111000101110011000110110111101101101
C O N . C O M

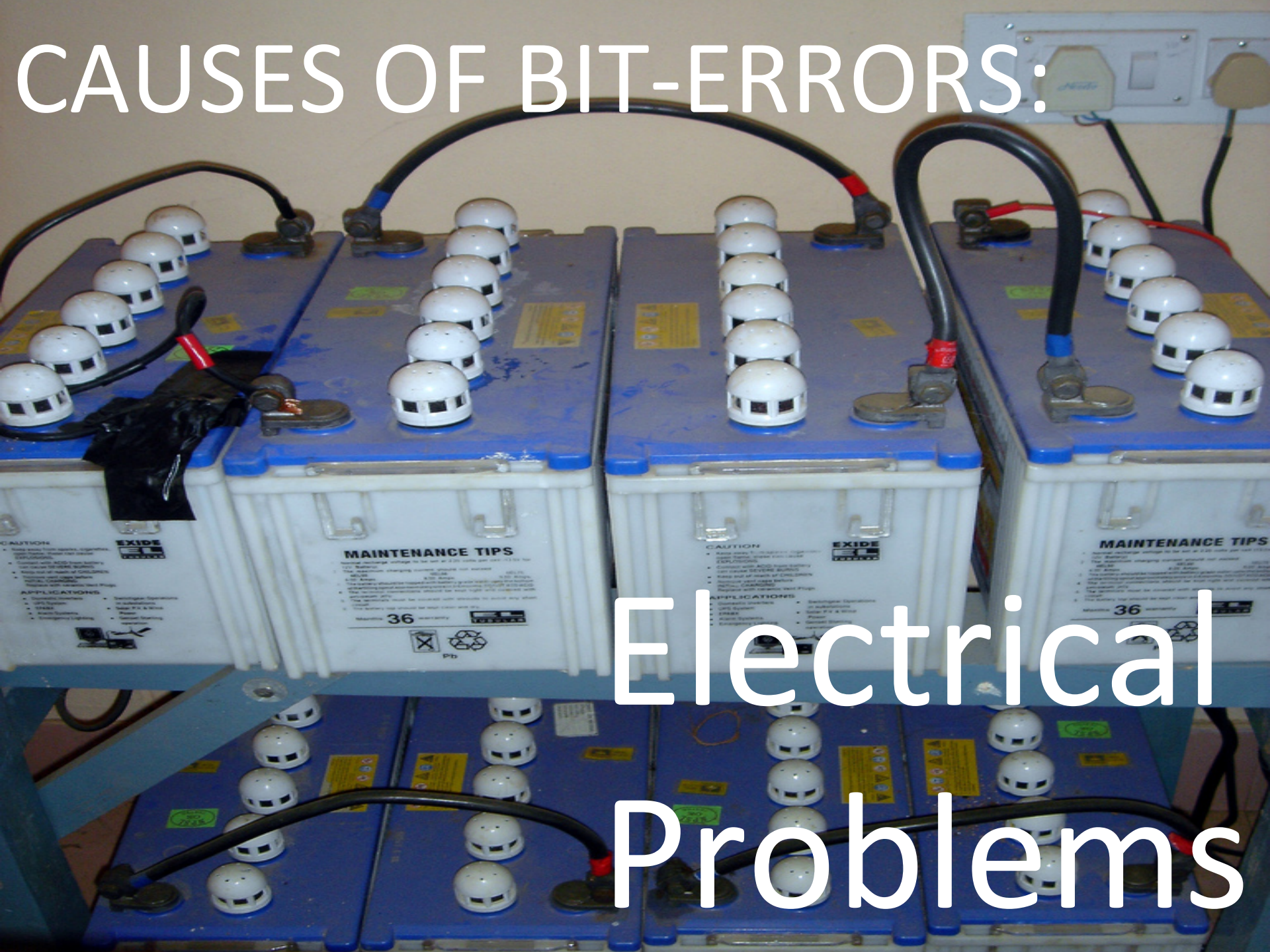

54C

CAUSES OF BIT-ERRORS:

Heat


iPhone Operating Temperature
120
100
80
60
40
20
0
Temperature (F)
Las Vegas
Montreal
iPhone

CAUSES OF BIT-ERRORS:



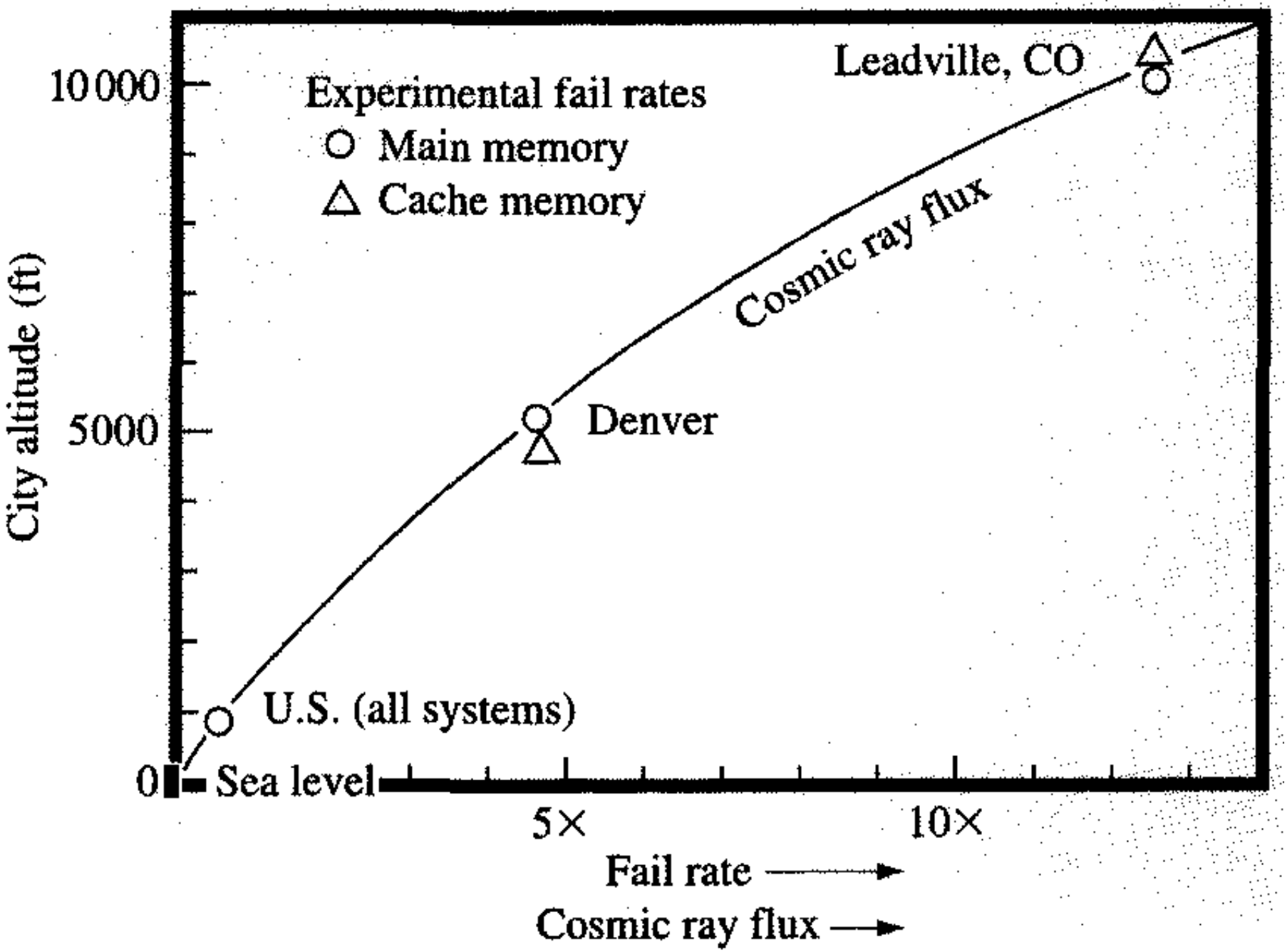
Electrical Problems

CAUSES OF BIT-ERRORS:

Defects

CAUSES OF BIT-ERRORS:

Cosmic Rays



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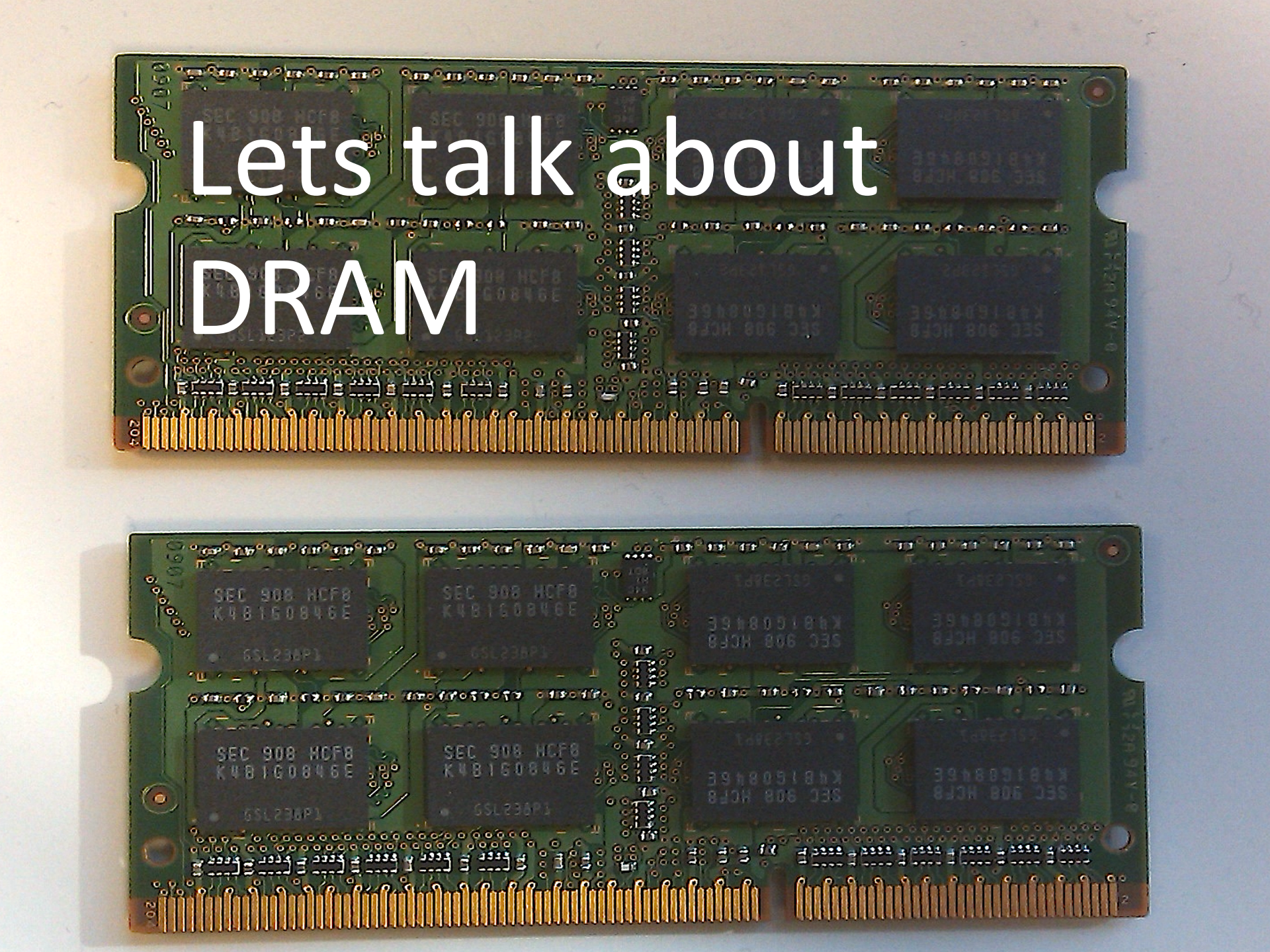
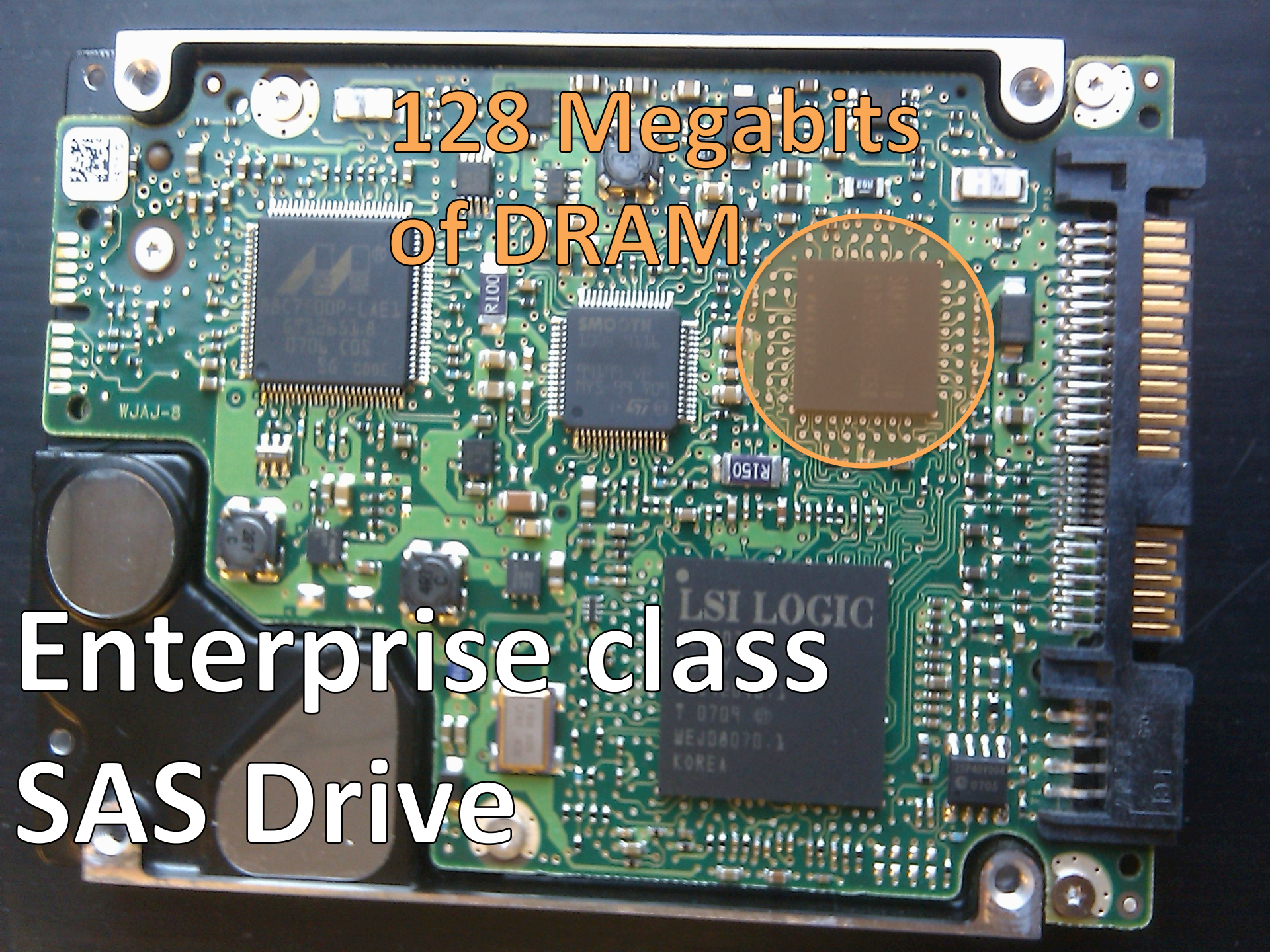
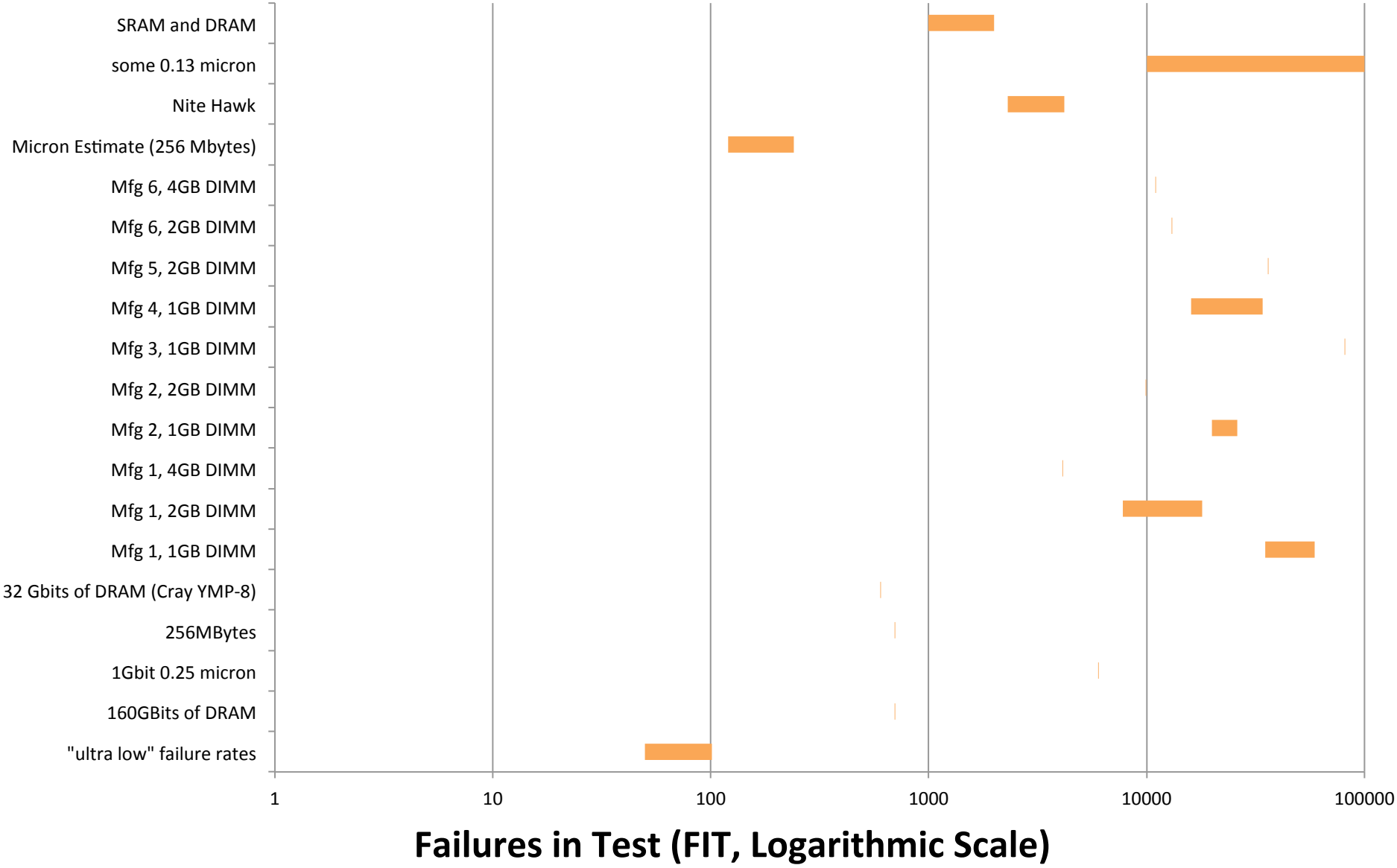
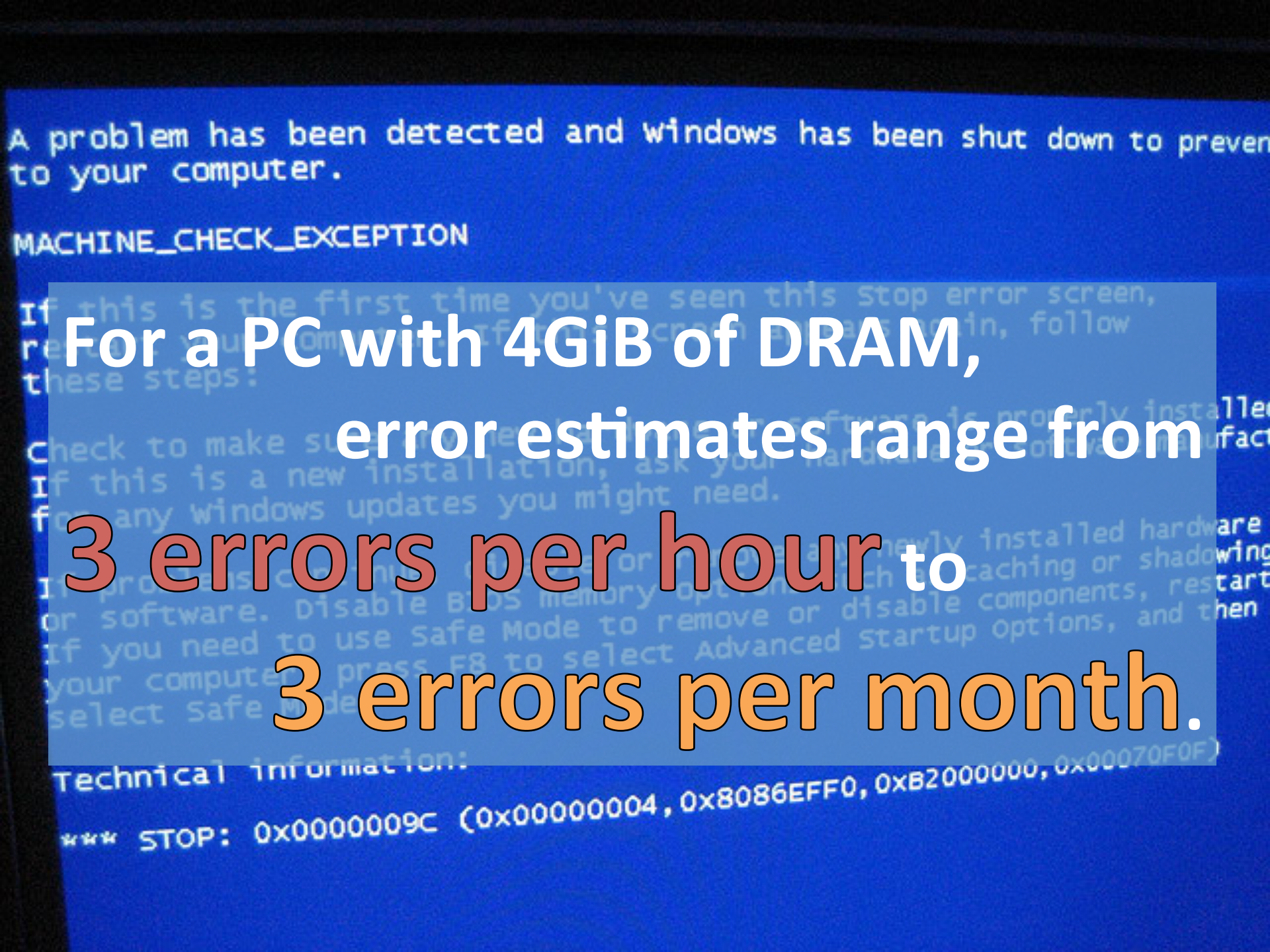

Lets talk about
DRAM

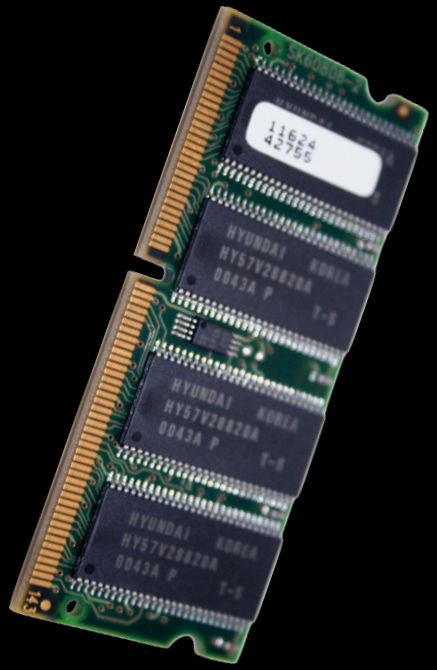

128 Megabits
of DRAM
LSI LOGIC
Enterprise class
SAS Drive

DRAM Failure Rates




A problem has been detected and windows has been shut down to preven
to your computer.
MACHINE_CHECK_EXCEPTION
For a PC with 4GiB of DRAM,
error estimates range from
3 errors per hour to
3 errors per month.
Technical information:
*** STOP: 0x0000009C (0x00000004,0x8086EFF0,0xB2000000,0x

×


HYUNDAI
HY57V28820A
HYUNDAI
HY57V28820A
HYUNDAI
HY57V28820A

=

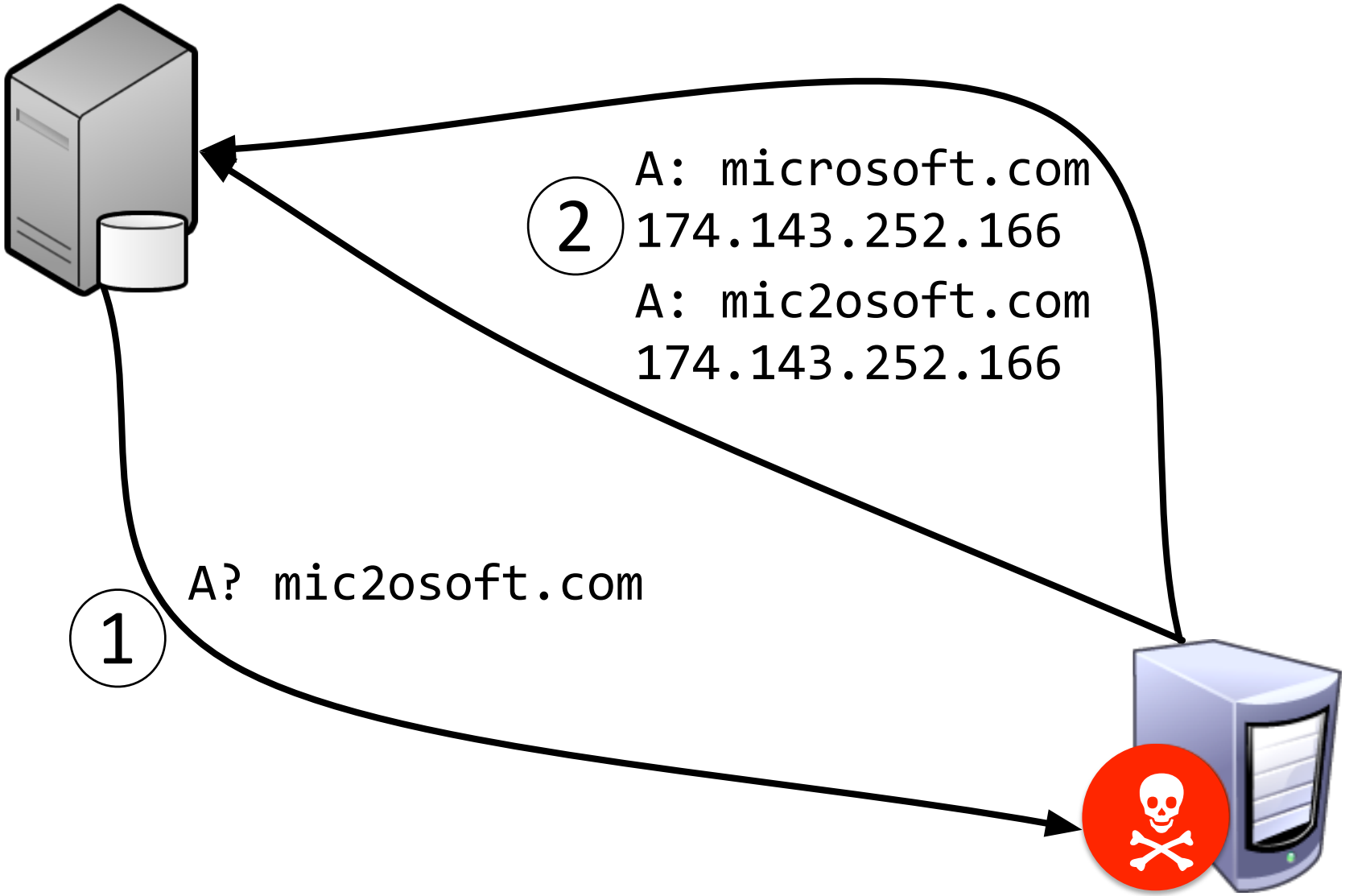
600 PiB

Experiment: Step 1

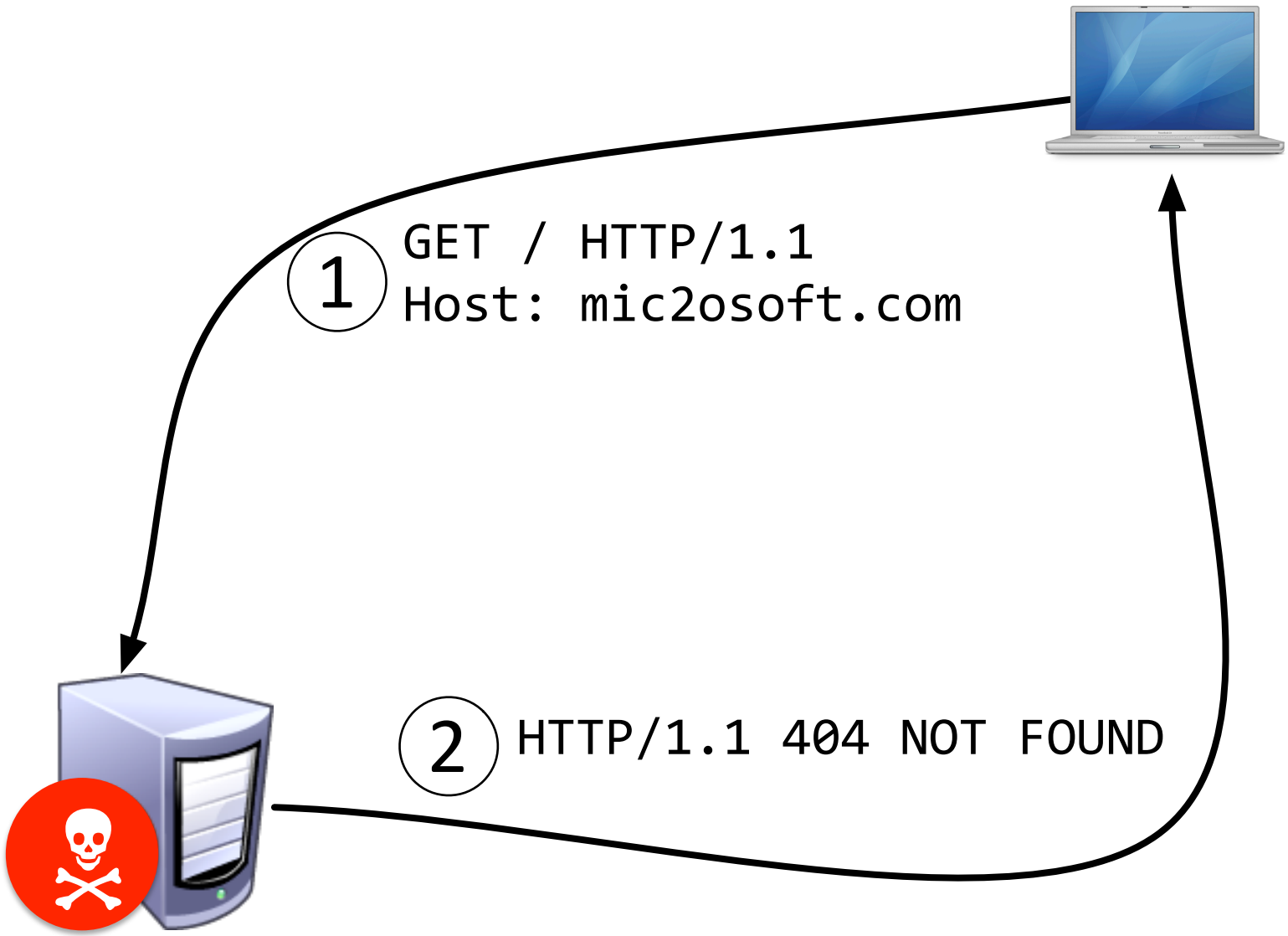
ikamai.net
aeazon.com
a-azon.com
amazgn.com
microsmft.com
micrgsoft.com
miarosoft.com
iicrosoft.com
microsnft.com
mhcrosoft.com
eicrosoft.com
mic2osoft.com
micro3oft.com
doublechick.net
do5bleclick.net
doubleslick.net

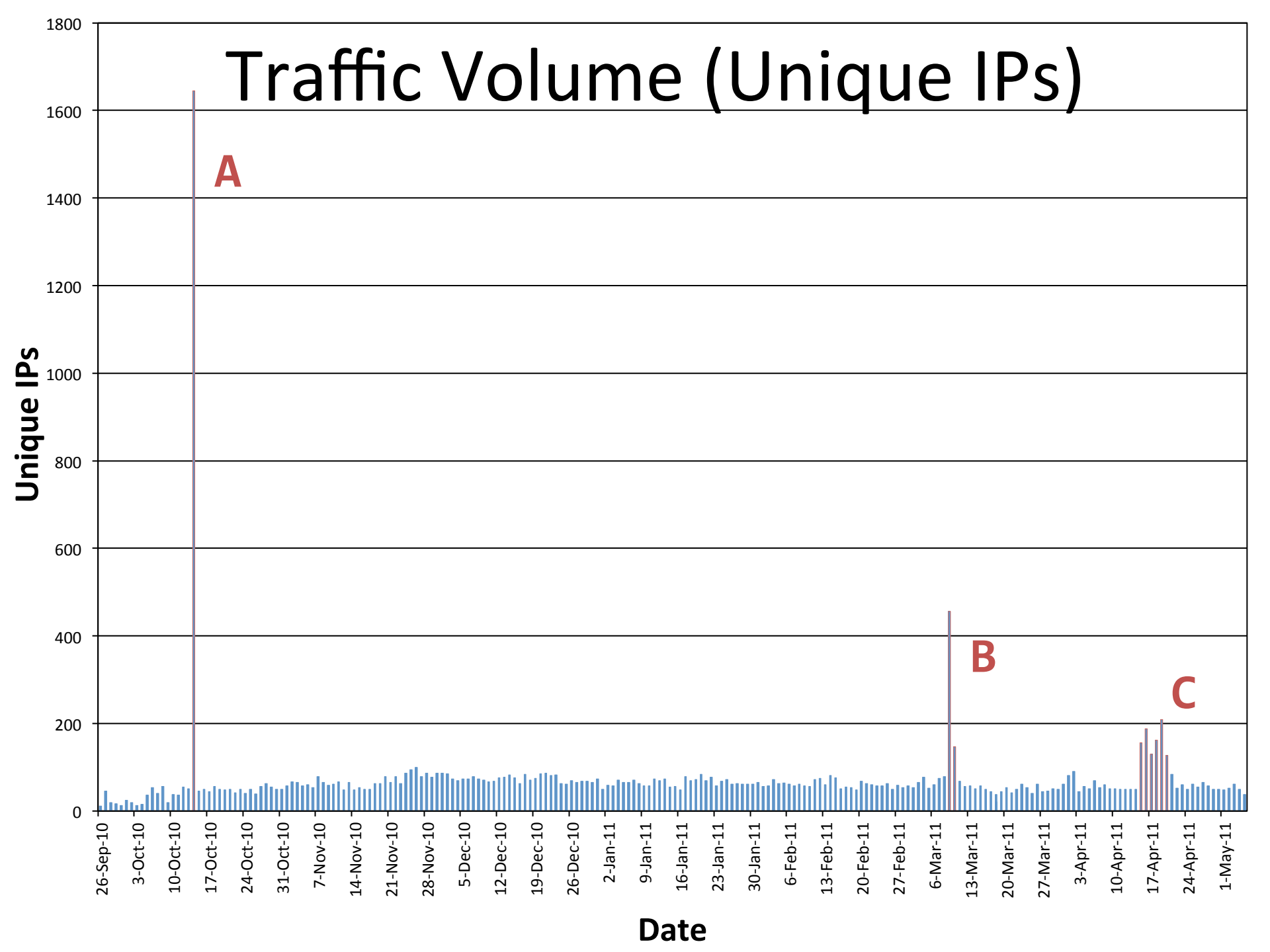
li6e.com
0mdn.net
2-dn.net
2edn.net
2ldn.net
2mfn.net
2mln.net
2odn.net
6mdn.net
fbbdn.net
fbgdn.net
gbcdn.net
fjcdn.net
dbcdn.net
roop-servers.net
gmaml.com

Experiment, Step 2

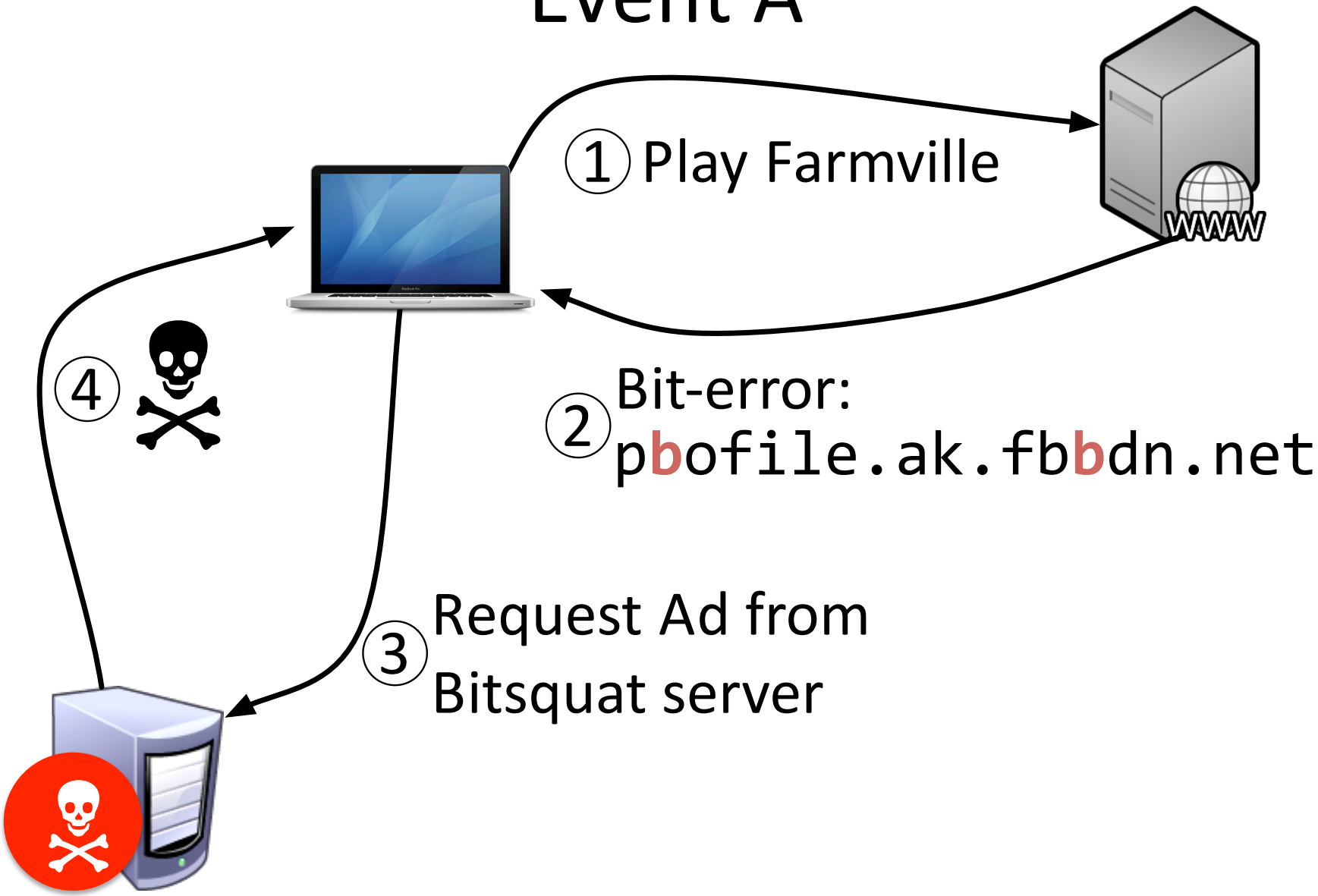


Experiment, Step 3

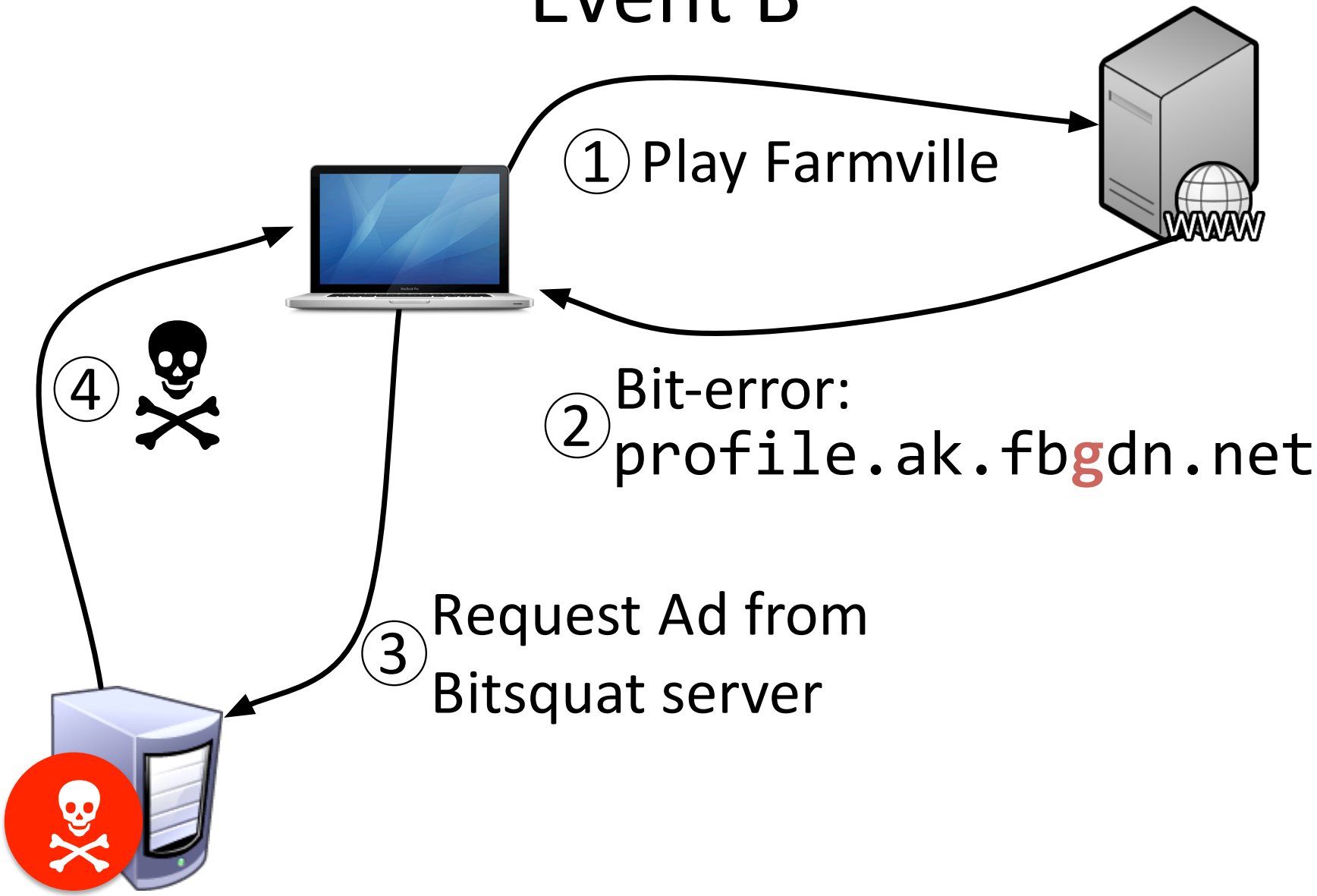



Traffic Volume (Unique IPs)
Unique IPs
1800
1600
1400
1200
1000
800
600
400
200
0
A
B
C
26-Sep-10
3-Oct-10
10-Oct-10
17-Oct-10
24-Oct-10
31-Oct-10
7-Nov-10
14-Nov-10
21-Nov-10
28-Nov-10
5-Dec-10
12-Dec-10
19-Dec-10
26-Dec-10
2-Jan-11
9-Jan-11
16-Jan-11
23-Jan-11
30-Jan-11
6-Feb-11
13-Feb-11
20-Feb-11
27-Feb-11
6-Mar-11
13-Mar-11
20-Mar-11
27-Mar-11
3-Apr-11
10-Apr-11
17-Apr-11
24-Apr-11
1-May-11
Date

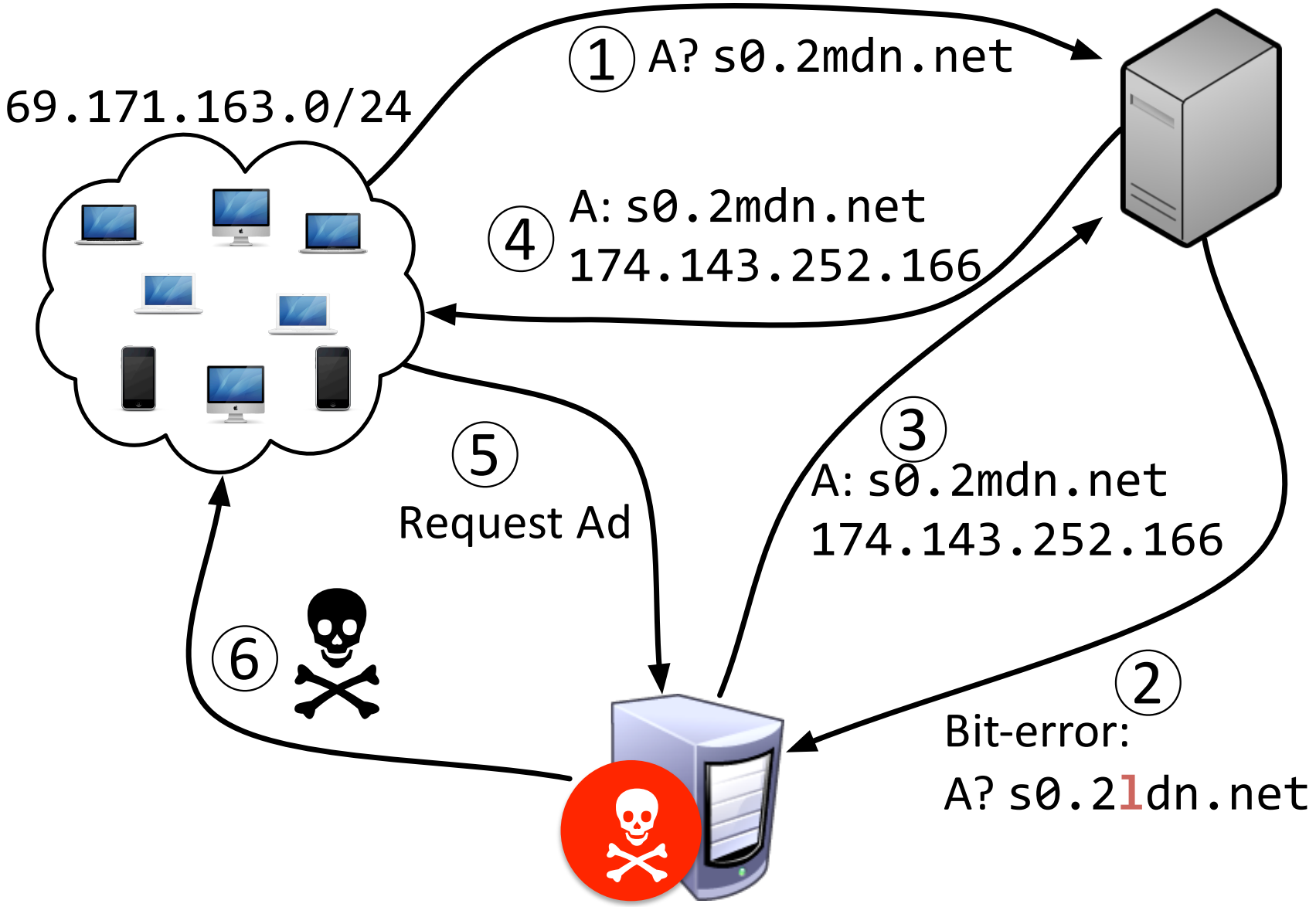
Event A

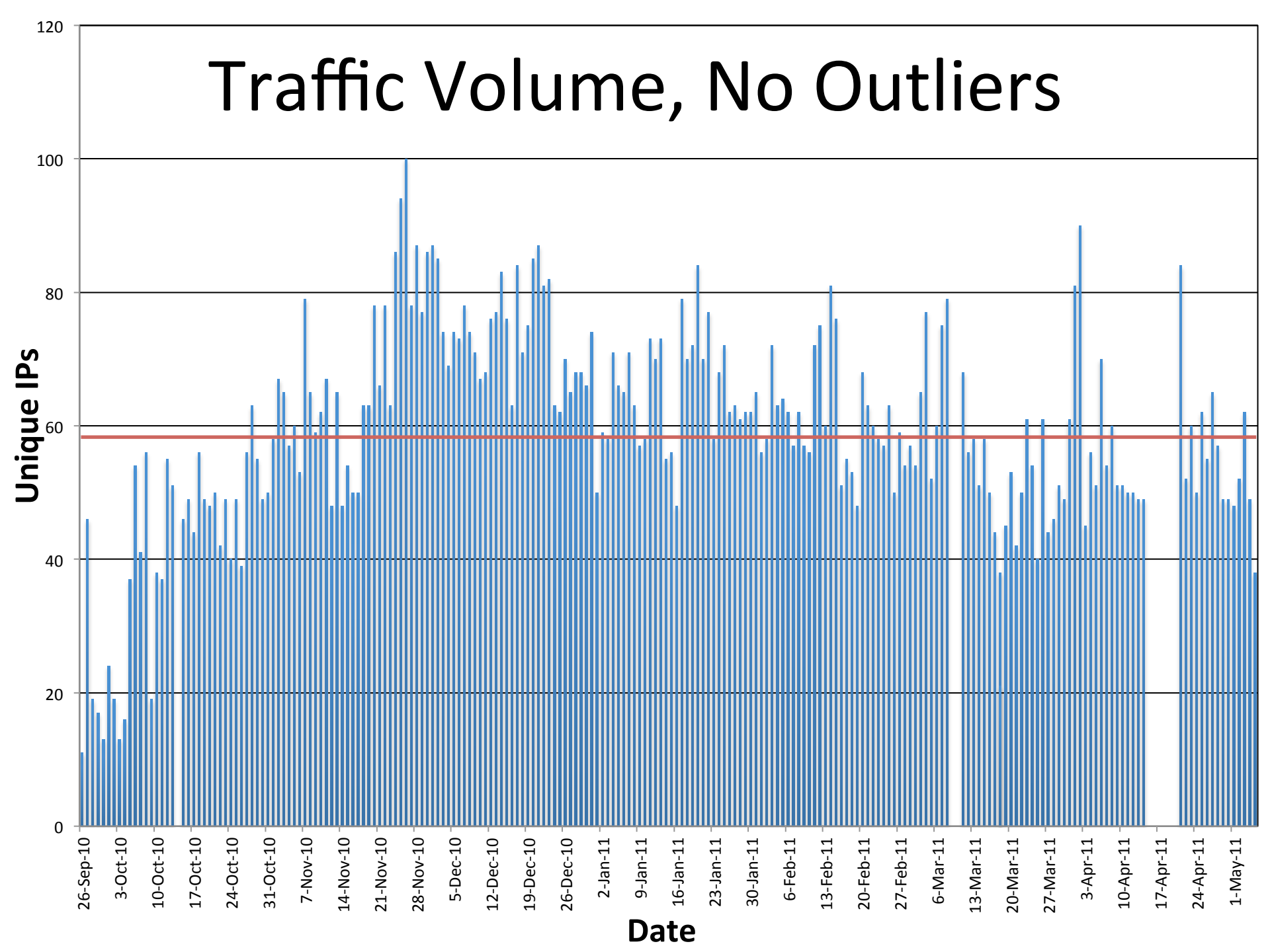

① Play Farmville
WWW
② Bit-error:
pbofile.ak.fbbdn.net
③ Request Ad from
Bitsquat server
④

Event B

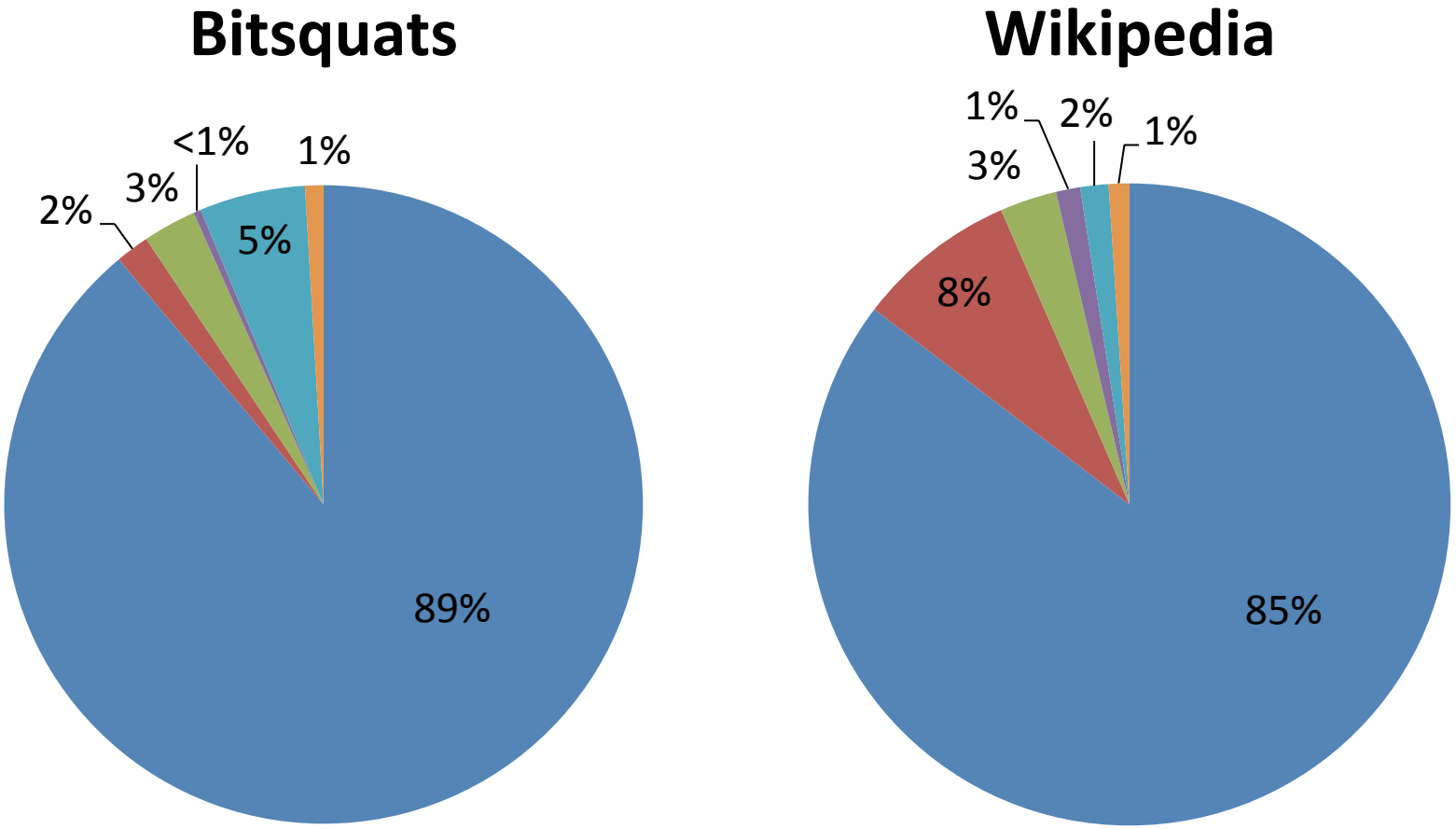

① Play Farmville
WWW
② Bit-error:
profile.ak.fbgdn.net
③ Request Ad from
Bitsquat server
④

Event C

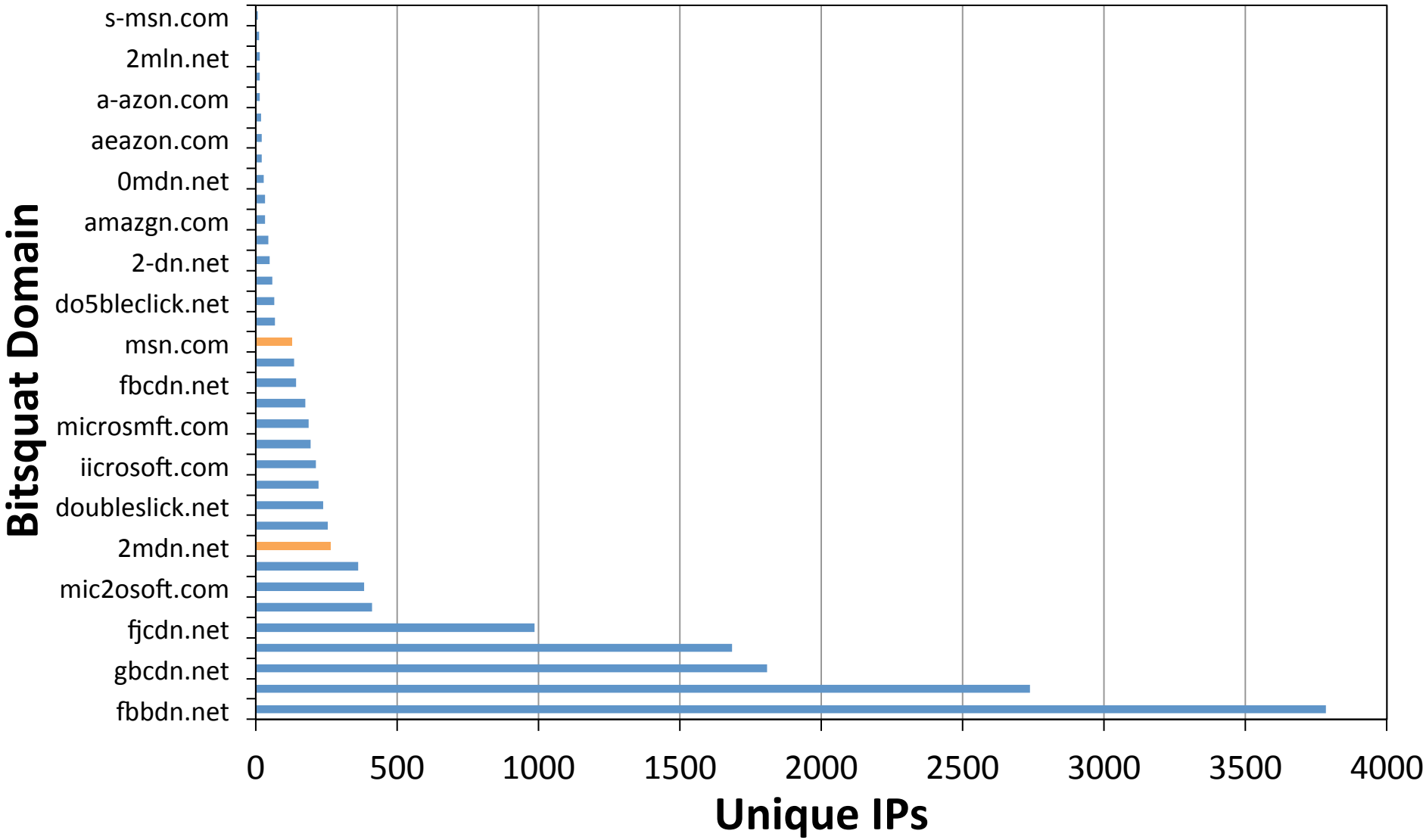

69.171.163.0/24
1 A? s0.2mdn.net
4 A: s0.2mdn.net
174.143.252.166
3 A: s0.2mdn.net
174.143.252.166
5 Request Ad
6
2 Bit-error:
A? s0.2ldn.net


Traffic Volume, No Outliers
Unique IPs
Date
120
100
80
60
40
20
0
26-Sep-10
3-Oct-10
10-Oct-10
17-Oct-10
24-Oct-10
31-Oct-10
7-Nov-10
14-Nov-10
21-Nov-10
28-Nov-10
5-Dec-10
12-Dec-10
19-Dec-10
26-Dec-10
2-Jan-11
9-Jan-11
16-Jan-11
23-Jan-11
30-Jan-11
6-Feb-11
13-Feb-11
20-Feb-11
27-Feb-11
6-Mar-11
13-Mar-11
20-Mar-11
27-Mar-11
3-Apr-11
10-Apr-11
17-Apr-11
24-Apr-11
1-May-11

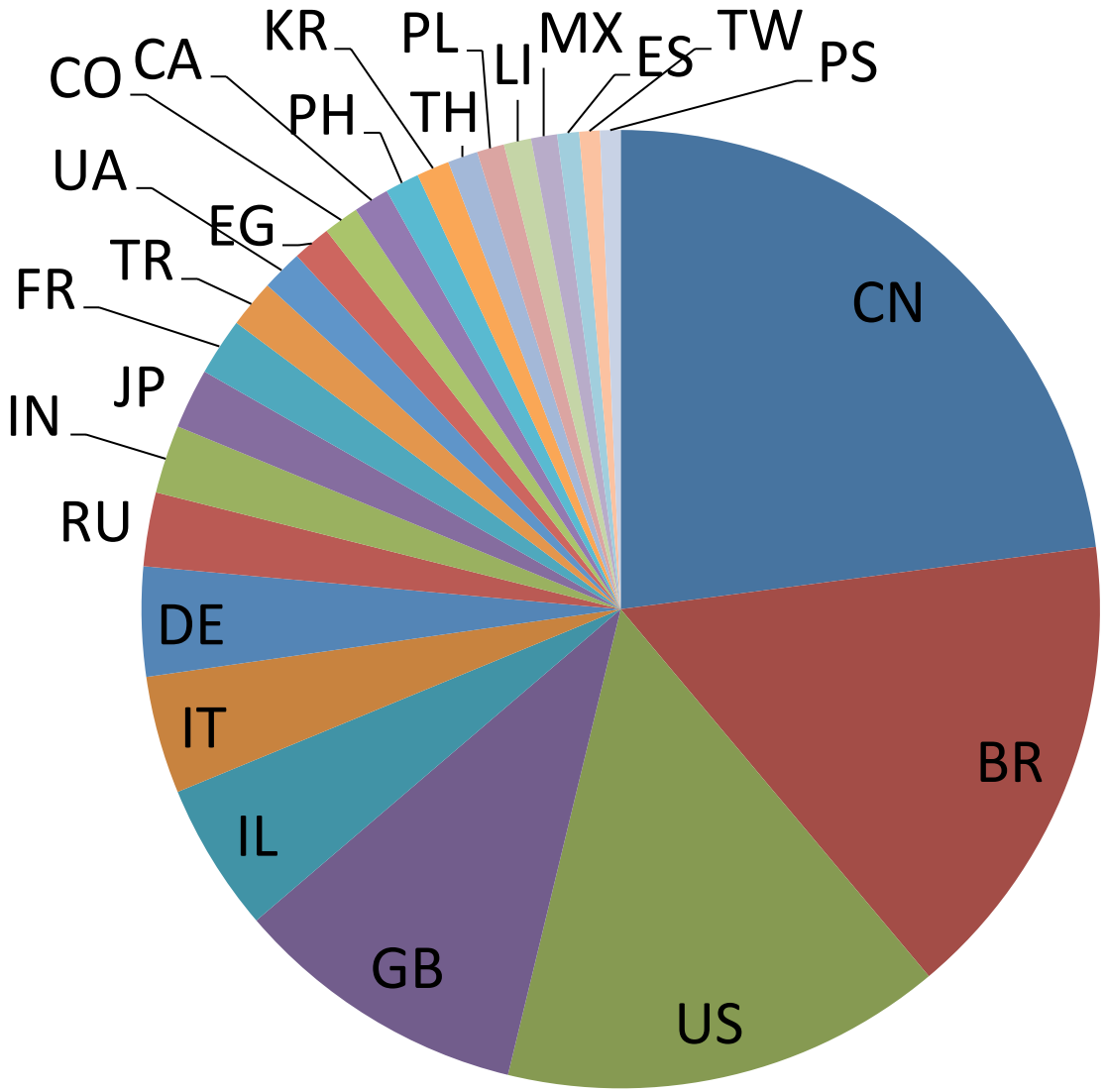
OS Statistics



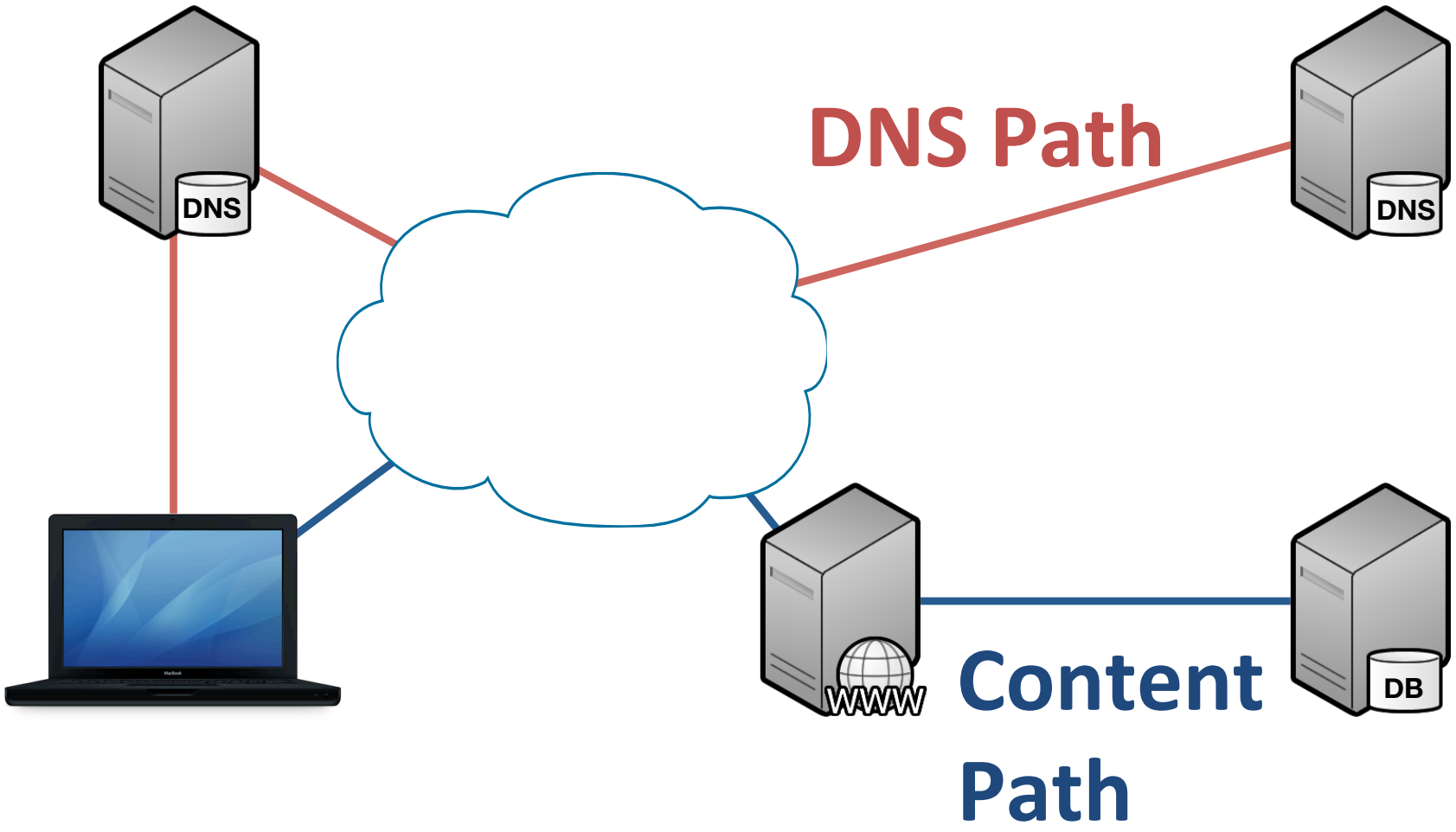
Bitsquat Popularity



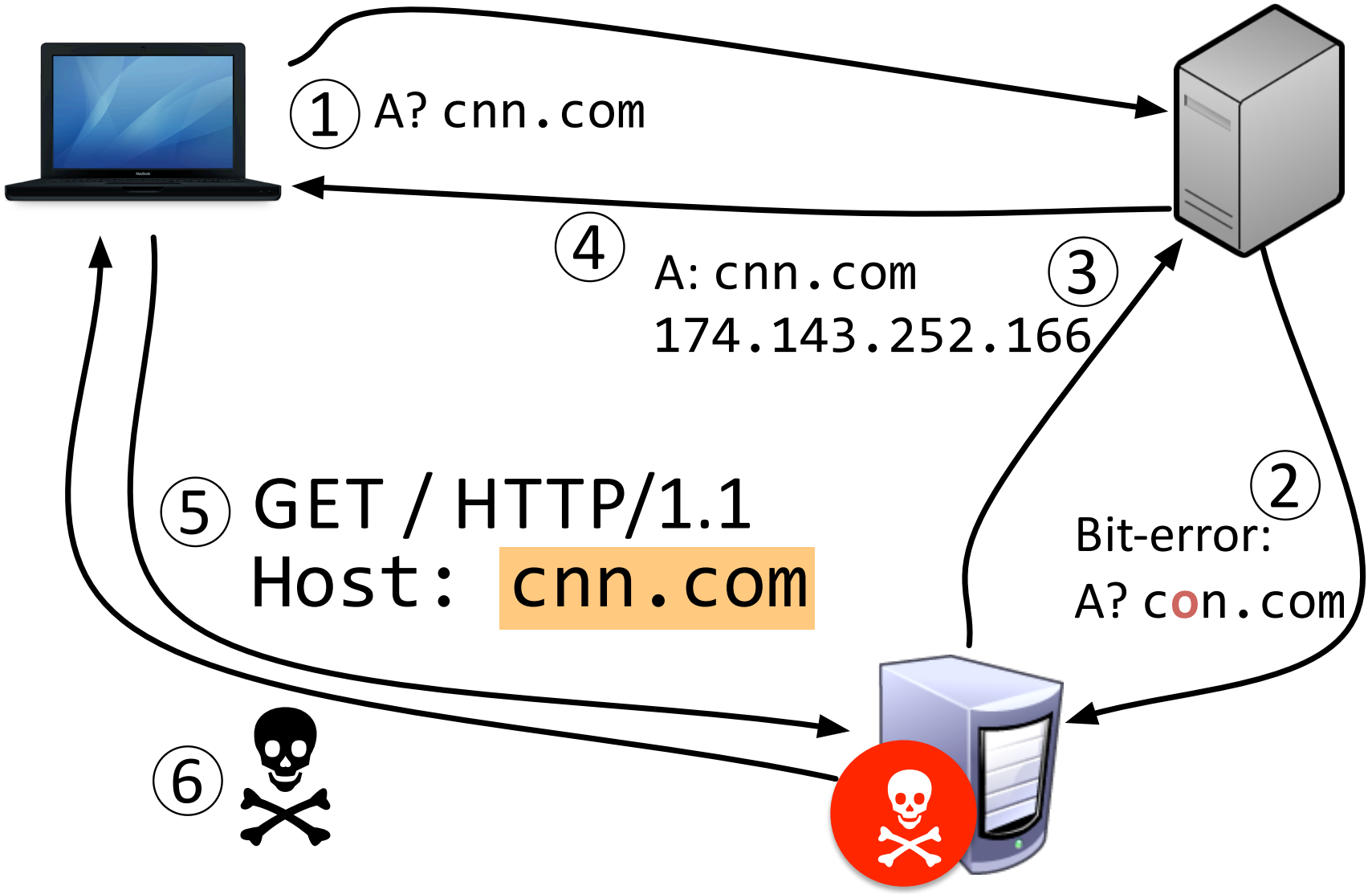
Visitors by Country (bitsquats of Microsoft.com)



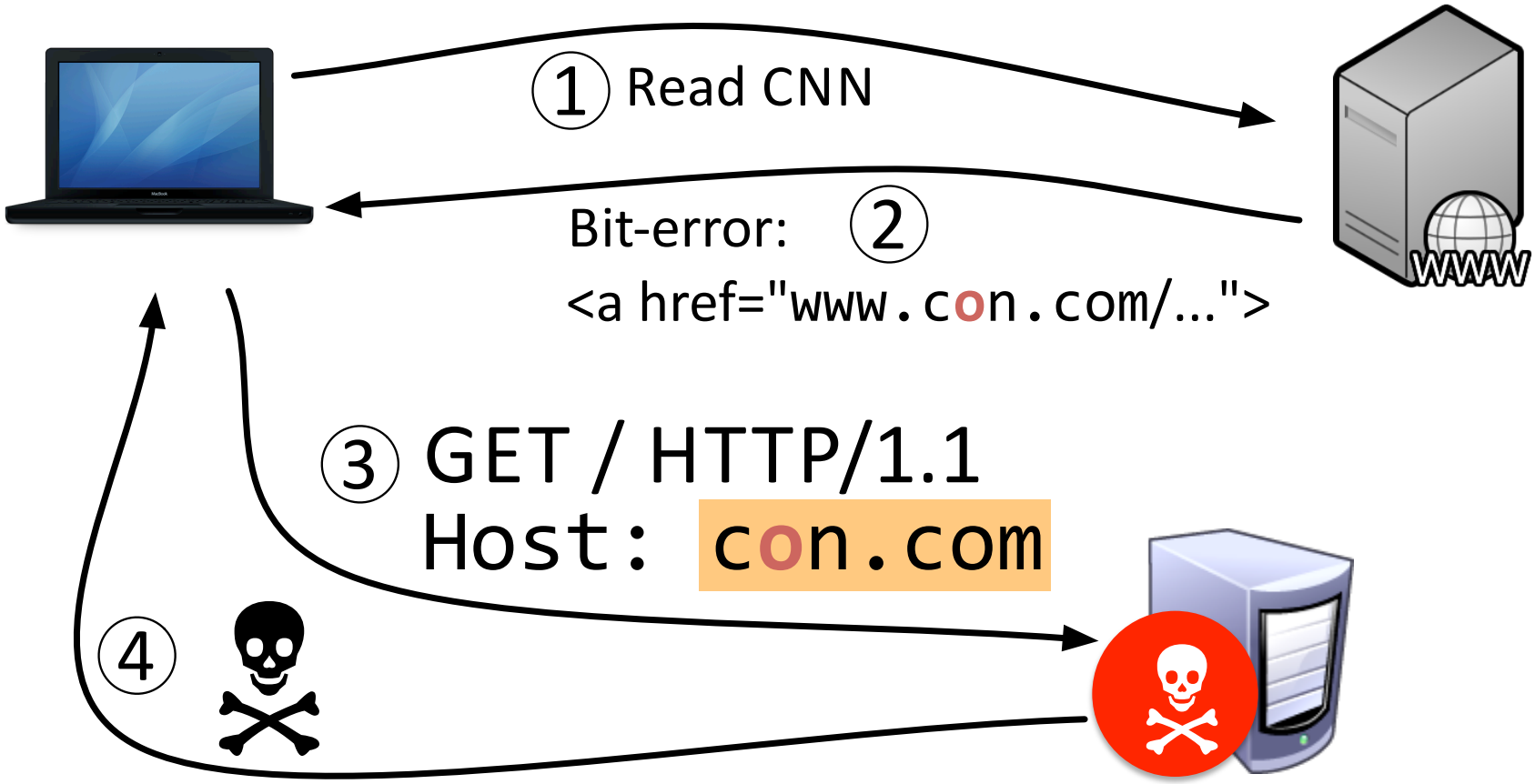
Where Bit-errors Happen



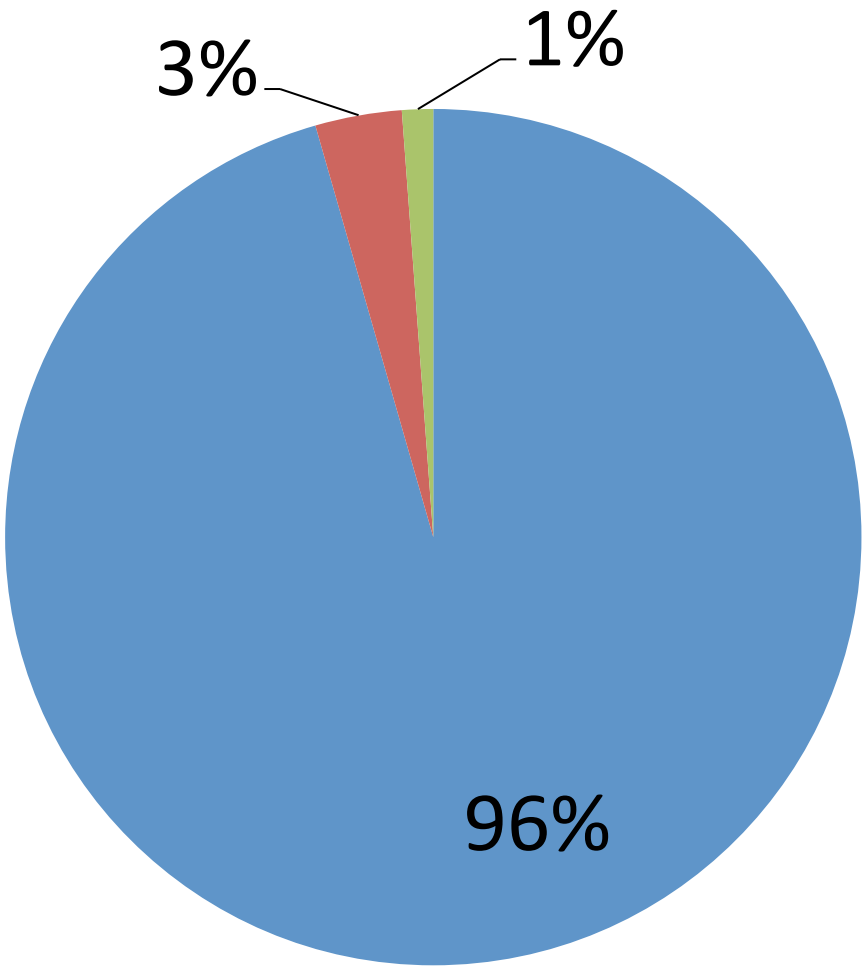
Bit-errors on the DNS Path



Bit-errors on the Content Path



Domain in HTTP Host Header

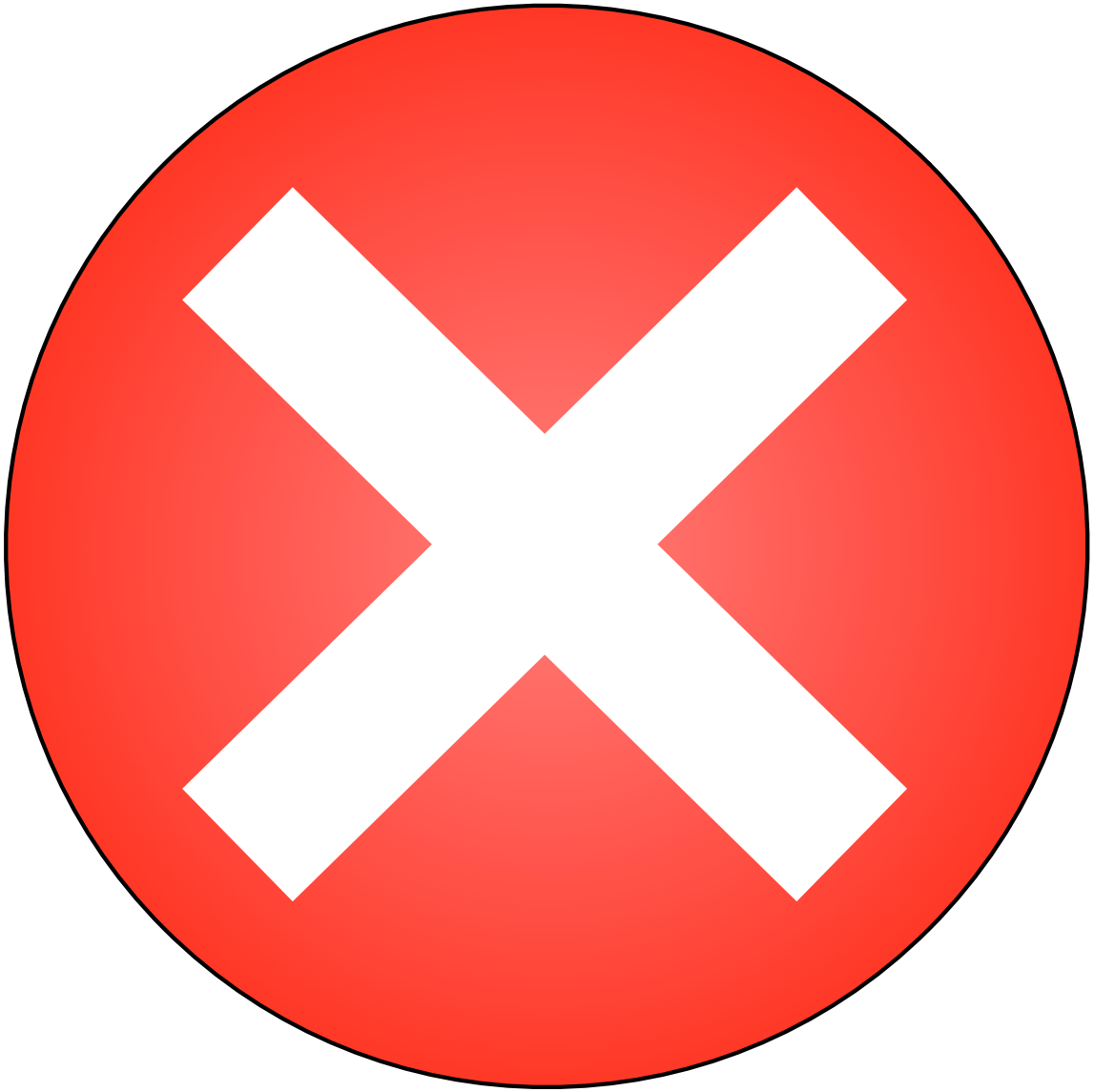


Bitsquat Original Other

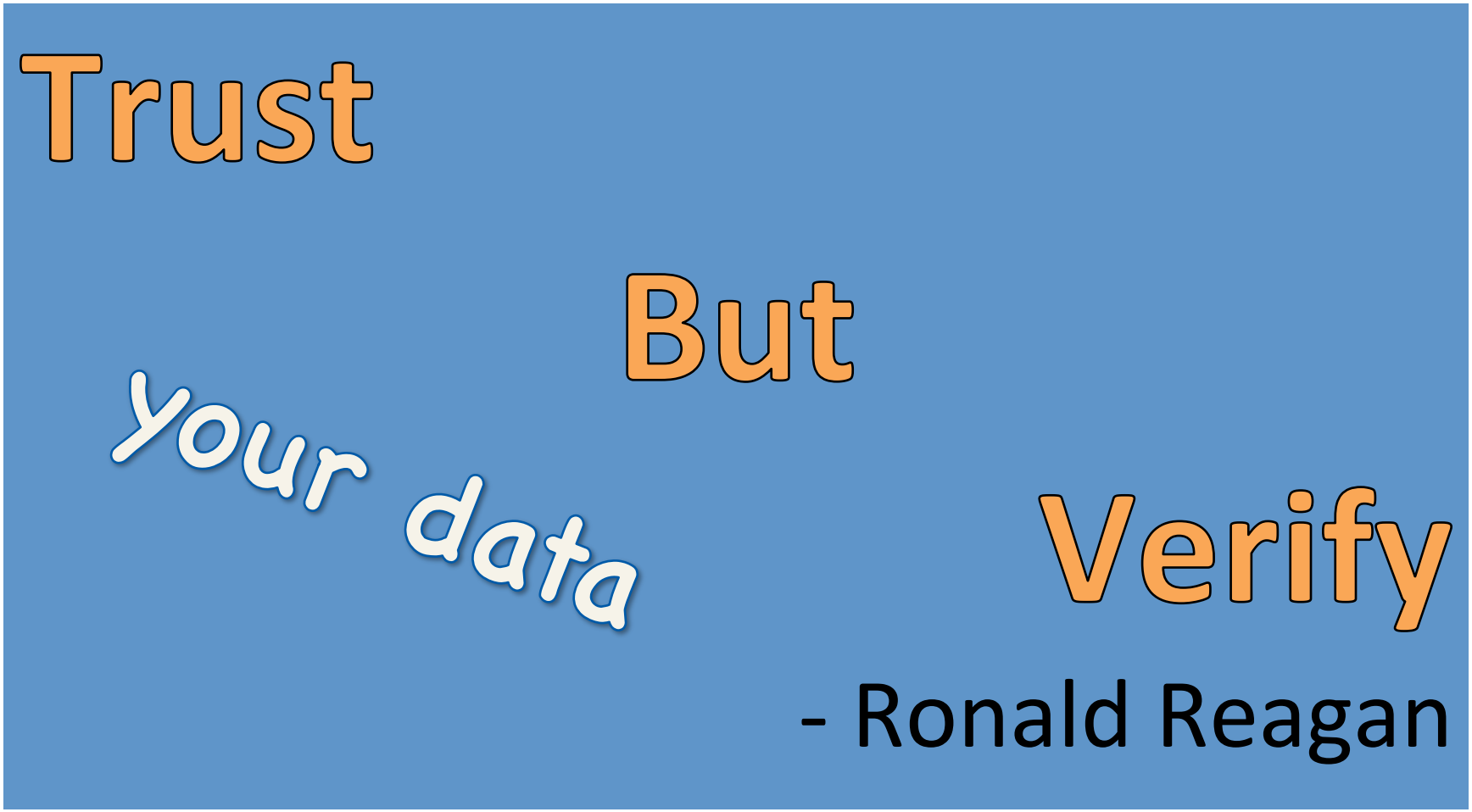
Mitigations

ECC ON EVERYTHING

Mitigations



Mitigations



Questions?

Image Attribution

- Slide 3: Earth. NASA
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- Slide 15: Desert Sun. Flickr User: Steve & Jemma Copley
- Slide 17: Backup Power. David Robinson. Flickr User: dgrobinson
- Slide 18: Fake Capacitor. Found on Internet, likely from chinauser.cn
- Slide 19: Homunculus Nebula. NASA
- Slide 21: DRAM. Self
- Slide 22: SAS Drive. Self
- Slide 24: BSOD. Wayne Williamson. Flickr User: ka3vo
- Slide 25: Blue Marble. NASA