

# In the Blink of an Eye...

A discussion of digital insecurity

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John Aleshunas

Math & Computer Science Department

Walker School of Business and Technology

Webster University

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# Quote

*I don't think necessity is the mother of invention – invention, in my opinion, arises directly from idleness, probably also from laziness, to save oneself trouble.*

– Agatha Christie

# The reason why...

□ why is the red light on top?



# Three Basic Concepts

- Speed

- Simplicity

- Convergence

# Speed

- ▣ The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued with the same meaning until the middle of the 20th century.
- ▣ Digital computers excel at completing large quantities of simple operations extremely fast.

# How long does it take to blink?



- A typical eye blink takes 100 to 400 milliseconds [0.1 sec]
- Not very quick

# Timescale

□ 1,000,000 events

- at 0.1 sec => 1.16 days
- at 0.001 sec => 16.67 minutes
- at 0.000001 sec => 1 sec

# Why is speed important?

## ▣ High speed algorithmic trading

- Financial investment firms are buying and rehabbing properties in Tribeca Manhattan because it sits on an Internet hub. [-0.000008 sec]
- This summer a convoy of special ice breakers will begin to lay trans-Arctic submarine fiber optic cables. This project will cost \$1.5 billion. [-0.06 sec]
- The average amount of time a stock is held => 22 seconds



# Note...

- Cryptographic and authentication processes trade time for security
- And everyone knows that time is...

# Simplicity

- Networking
- E-mail
- world-wide web
- RFID

# An example of traffic simplicity

- ▣ The roundabout



# Networking

## □ Early protocols

- Token ring
- Token bus

## □ Ethernet [Robert Metcalfe 1973]

- Simple twisted-pair cable
- Best-try transmission protocol
- Resend a packet when a collision occurs

# E-Mail

- E-mail is a method of exchanging digital messages from an author to one or more recipients. An email message consists of three components, the message *envelope*, the message *header*, and the message *body*.
- This is the basic concept for any messaging system [SMS, Twitter, IM, etc.]
- Proprietary host-based mail systems [1961]
- ARPANET e-mail [1971]
- Internet e-mail system interoperability [1981]
- Unless augmented, all e-mail is unsecure

# World-wide Web

- The world wide web is a system of interlinked hypertext documents accessed via the Internet.
- This system has three primary components:
  - A web server [with a file database]
  - A client browser [executes web page content]
  - The Internet [a network]
- Can be secure [SSL/TLS]

# RFID

[radio frequency identification]

- Pet chip
- Sport sensors
- Truck interstate tolls
- Inventory management
- Passports
- Access control
- Token payment systems

# Underlying concept...

- Each of these technologies assume a benign environment
- The Internet is not a benign environment.



# Convergence

- Technologies
- Digital mono-culture
- Opportunities and risks

# Technologies



# More technologies



# Potential implications

## Hackers Crack Into Texas Road Sign, Warn of Zombies Ahead

*Published January 29, 2009 / FoxNews.com*



Texas Dept. of Transportation officials confirm a portable traffic sign at Lamar Boulevard and West 15th Street in Austin was hacked into last week.

# Digital mono-culture

## ▣ Two viewpoints

- what if everyone can share?
- *One Ring to rule them all, One Ring to find them,  
One Ring to bring them all and in the darkness bind them*

OUR FUTURE IS A UNIFIED ECOSYSTEM  
ENHANCED BY MICROSOFT CLOUD SERVICES

Office 365 Windows Live bing zune XBOX LIVE skype Windows Explorer 9

DESKTOP LAPTOP TABLET SLATE READER SMARTPHONE/MUSIC TV

USER INTERFACE: MOUSE, KEYBOARD PEN, HANDWRITING TOUCH REMOTE

NEW NATURAL USER INTERFACES

PHYSICAL INTERACTION: Multi-Touch Handwriting  
CONTEXTUAL RECOGNITION: Motion Speech Facial Location

Unified Ecosystem And Connected User Experiences Across Hardware & Software!

# Friday, 23 March 10:57 AM...

## Apple 2.0 Covering the business that Steve Jobs built

### Apple trading halted, resumes

By Philip Elmer-DeWitt March 23, 2012 11:53 AM ET

FORTUNE

37 comments

**A circuit breaker kicked in after high-frequency trades from BATS triggered a flash crash**

The hearts of Apple (AAPL) traders stopped briefly at 10:57 a.m. Friday when the company's share price, which had opened the day at \$600.49 suddenly plummeted 9.4% to \$542.80.

The rapid fall triggered a circuit breaker and trading was halted for five minutes. When it resumed, Apple was down \$3 to \$597.58.

The source was quickly traced to a flurry of high-frequency trades issued by BATS Global Markets, one of the largest high-frequency computer-driven trading platforms. BATS operates two exchanges which together account for 10% to 12% of all U.S. equity trading on a daily basis.



Source: Seeking Alpha

# Quote

*At the source of every error which is blamed on the computer you will find at least two human errors, including the error of blaming it on the computer.*

– Tom Gibb

# Discussion