

A presentation by Albert Wang  
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08/12/2015



# Safe Computing @MIT

What everyone needs to know

# Email

- Important: MIT will \*NEVER\* ask you for your password, nor will MIT send you email requesting your password or other confidential information. Please delete all email messages that request such information. They are social engineering scams designed to steal your information.
- These social engineering scams are called “PHISHing”.
- The above applies to telephone calls as well. (telemarketing, Nigerian 419, phishing, 809 scam, etc)

# Spam

- **Spam** is the use of electronic messaging systems to send unsolicited bulk messages, especially advertising, indiscriminately. While the most widely recognized form of spam is e-mail spam, the term is applied to similar abuses in other media.
- MIT Anti-Spam Resources: <http://ist.mit.edu/spam>
- Exchange users get Spam Quarantine: <https://mailsec-cc.mit.edu/brightmail/>
- Authenticate with your MIT Kerberos username and password.

# Attachments

- Never open attachments from people you don't know.
- Never open attachments from people you do know but weren't expecting an attachment from. Delete the email immediately.
- Attachments (some examples: pdf, doc, jpg, exe, zip, gzip) are used as Trojan horses by bad people to deliver bad stuff like viruses, malware, and root kits.
- If in doubt, email the sender to verify the attachment is legit.

# Bad Stuff

- **Viruses-** A computer virus is a computer program that can replicate itself and spread from one computer to another.
- **Malware-** Short for malicious (or malevolent) software, is software used or programmed by attackers to disrupt computer operation, gather sensitive information, or gain access to private computer systems.
- **Rootkit-** A stealthy type of software, often malicious, designed to hide the existence of certain processes or programs from normal methods of detection and enable continued privileged access to a computer.

# Free software

- Everybody loves the idea of free software.
- The only problem is the bad guys know this.
- The guise of free software is another common delivery device for bad stuff (malware, viruses, and rootkits).
- Free software is the most common delivery vehicle for bad stuff. So if your Mac or Windows asks you if you want to open or install any application you aren't sure about, always say NO.

# Safe 'free' software

- Legitimate shareware and freeware do exist, but Google them if you're not familiar to verify their authenticity. See what people are talking about.
- Anything published on CNET.com for download or on the IS&T Software Download page is safe.
- Some very good anti-malware and anti-virus programs are free and safe.
- When in doubt, ask either Dan or myself.

# Anti-Bad Stuff software

- Have one or two that you use. At MIT on work machines, Sophos is the one to use.
- Great free options. (Spybot S&D, Super AntiSpyware, Malwarebytes, AVG for PC) (ClamXAV, Avast! for Mac)
- Update it. Use it once in a while.
- Everyone should be using Sophos on their work machines at MIT. No one should be running McAfee at this point.



# Passwords

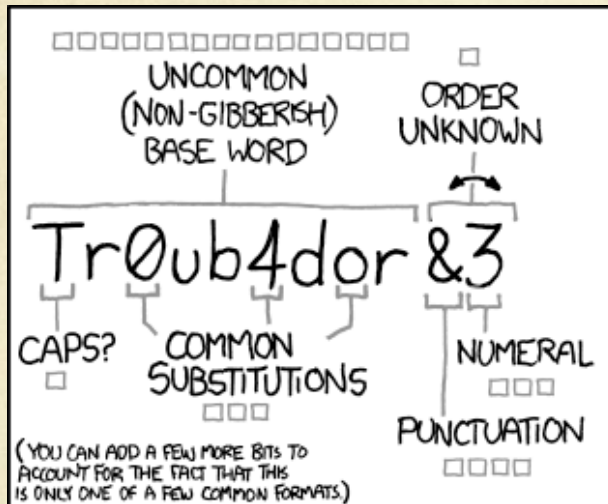
- According to the password management company SplashData, here are the 25 most common stolen passwords of 2013, along with the change in rank from last year.
- 1 **123456** (*Up 1*), 2 **password** (*Down 1*), 3 **12345678** (*Unchanged*), 4 **qwerty** (*Up 1*), 5 **abc123** (*Down 1*), 6 **123456789** (*New*), 7 **111111** (*Up 2*), 8 **1234567** (*Up 5*), 9 **iloveyou** (*Up 2*), 10 **adobe123** (*New*), 11 **123123** (*Up 5*), 12 **admin** (*New*), 13 **1234567890** (*New*), 14 **letmein** (*Down 7*), 15 **photoshop** (*New*), 16 **1234** (*New*), 17 **monkey** (*Down 11*), 18 **shadow** (*Unchanged*), 19 **sunshine** (*Down 5*), 20 **12345** (*New*), 21 **password1** (*Up 4*), 22 **princess** (*New*), 23 **azerty** (*New*), 24 **trustno1** (*Down 12*), 25 **000000** (*New*)



# What is a good password?

- Eight characters or longer. The longer, the better.
- Mixed case (lower and upper case letters), with a number, and a symbol.
- Something you'll easily remember.
- Eg. M@rvinthem@rtian, D@ffyduckisw@cky!, Gam3ofThron3s!, KingOftheN0rthStarkR0bb, Ie@tc@keonmybirthd@y!, Happydogsmilesatme2, Skippy\_peanut\_butter\_ducks?
- If you have to write it down, it's not a good password.

# What's easy to remember and hard to hack?



~28 BITS OF ENTROPY

$2^{28} = 3 \text{ DAYS AT } 1000 \text{ GUESSES/SEC}$

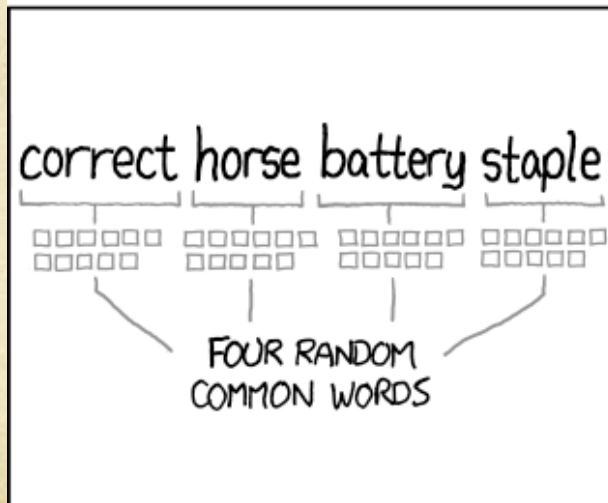
(PLAUSIBLE ATTACK ON A WEAK REMOTE WEB SERVICE. YES, CRACKING A STOLEN HASH IS FASTER, BUT IT'S NOT WHAT THE AVERAGE USER SHOULD WORRY ABOUT.)

DIFFICULTY TO GUESS: **EASY**

WAS IT TROMBONE? NO, TROUBADOR. AND ONE OF THE 0s WAS A ZERO?

AND THERE WAS SOME SYMBOL...

DIFFICULTY TO REMEMBER: **HARD**



~44 BITS OF ENTROPY

$2^{44} = 550 \text{ YEARS AT } 1000 \text{ GUESSES/SEC}$

DIFFICULTY TO GUESS: **HARD**

THAT'S A BATTERY STAPLE.

CORRECT!

DIFFICULTY TO REMEMBER: YOU'VE ALREADY MEMORIZED IT





THROUGH 20 YEARS OF EFFORT, WE'VE SUCCESSFULLY TRAINED EVERYONE TO USE PASSWORDS THAT ARE HARD FOR HUMANS TO REMEMBER, BUT EASY FOR COMPUTERS TO GUESS.


# Storing passwords

- Never send or store passwords in email.
- Many of us can end up with as many as 10 or more passwords for different accounts in our daily lives. Keeping track of which password goes where can be a challenge.
- If you have a lot of passwords, you can store the passwords in an encrypted (password protected) file or use a management system like LastPass, 1Password, KeePass.
- Don't keep passwords under your keyboard or written down on a piece of paper in your office.

# What happens if I lose that password?

The screenshot shows a news article on the Softpedia website. The article title is "Email Accounts from Top Universities on Sale on China's Taobao". The byline is "By Ionut Ilascu" dated "5 Sep 2014, 00:13 GMT". The article text discusses the sale of stolen email accounts from 42 top universities, including MIT, Stanford, Yale, Princeton, Harvard, Purdue, Columbia, Cornell, University of Chicago, and New York University. A sidebar on the right contains a search bar and a social media share button. At the bottom right, there is a promotional banner for software and games.

**SOFTPEDIA®** DESKTOP ▾ MOBILE ▾ WEB ▾ NEWS    

☰ Softpedia > News > Security FLASH SALE: System Mechanic Professional  60% OFF!

## Email Accounts from Top Universities on Sale on China's Taobao



*Accounts offer discount benefits from retailers and access to educational content*




**Individuals engaged in e-commerce activity on Chinese online shopping platform Taobao offer for sale stolen email accounts belonging to top universities across the world.**


The accounts offer various benefits, which include registration to software developer programs, discounts from certain retailers, as well as access to academic databases.

Provider of network security solutions Palo Alto Networks [found the information](#) available for sale after searching the listings on Taobao for "edu mailbox." The result returned 99 entries of email addresses and passwords for 42 top universities from ten countries.

19 educational institutions in the US were robbed of the accounts, among the owners being MIT, Stanford, Yale, Princeton, Harvard, Purdue, Columbia, Cornell, University of Chicago, and New York University.

By Ionut Ilascu   5 Sep 2014, 00:13 GMT

 麻省理工大学 账号 MIT.EDU 邮箱 账号 数据库 账号  
价格 ¥800.00  
卖家 卖家成功： 买家评价：  
配送 美国 亚马逊 - 快递 物流服务  
数量 1 件 (共9999999件)  
**立即购买**  
语言  通知物品  
支付  支付宝支付  微信支付

 Email account sold on Taobao offers access t...

**We work hard every day to bring you the latest software & games tech**

September 2014

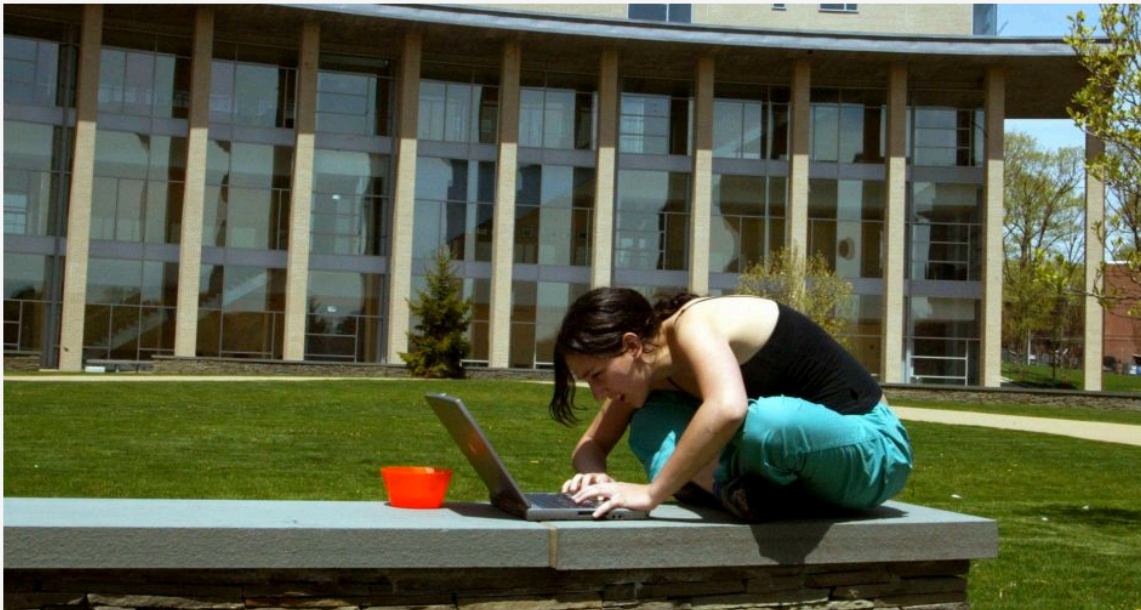
<http://news.softpedia.com/news/Email-Accounts-from-Top-Universities-On-Sale-on-China-s-Taobao-457697.shtml>

# MIT credentials on sale on Alibaba's Taobao

OUR PICKS   LATEST   POPULAR   **QUARTZ**   OBSESSIONS   🔍   ...

**YOU'VE GOT FAKES**

## For \$390 you can illegally buy an elite university email account on China's biggest online marketplace



☰

September 2014

<http://qz.com/263013/for-390-you-can-buy-a-harvard-email-account-on-chinas-biggest-online-marketplace/>

## MIT credentials on sale on Alibaba's Taobao

A gas can full of snake bile, breast-milk soap, the head of Tom Cruise —those are just some of the odd things you can buy on Alibaba's Taobao, China's biggest consumer-to-consumer online marketplace. Add to that a fake or stolen university email addresses. In an investigation last week, IT security company Palo Alto Networks found email accounts from 42 universities for sale on Taobao, ranging from 0.98 yuan to 2,400 yuan (\$0.16 to \$390).

What “.edu” accounts were up for grabs? The 19 US universities included many Ivy League colleges, Massachusetts Institute of Technology, Duke, Stanford, as well as some less obvious choices to claim as one's fake alma mater (e.g. University of California, Merced).

September 2014

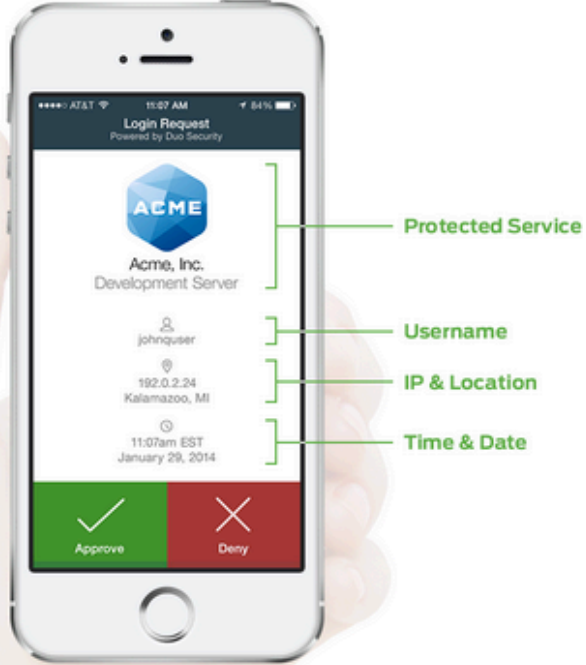
<http://qz.com/263013/for-390-you-can-buy-a-harvard-email-account-on-chinas-biggest-online-marketplace/>

# What if they also got your MIT ID number?

- They can go to IS&T's website and get your certificates installed on their computer.
- Certificates allow a malicious user universal access to private data in your Atlas, retirement information, access to the MIT library resources, authorized access into MIT academic systems, and even allow the user to change your MIT password.
- Certificates DO NOT EXPIRE until the end of July.
- Once an MIT certificate is issued in a browser on a computer it CANNOT be revoked!



# Two Factor Authentication



**Authentication**

## Secure, Out-of-Band Authentication With Just One Tap

Using Duo's mobile app, your users can authenticate easily by simply responding to a push notification. Or, users can choose to answer a phone call, type in a passcode, or even use hardware tokens.

Give your users the ultimate flexibility to authenticate no matter where they are, and what kind of connectivity they have.

[Learn More About Authentication >>](#)

This is an example of Duo's app in use. It can accept both push notifications like seen above (Accept/Deny) or give you a rolling numerical password.

# Two Factor Authentication

- In addition to certificates and the traditional username and password, a second factor authentication device provides a rolling numerical password that changes over time (like every 60 seconds).
- Why is this good?
- Because now even if bad guys have stolen your username, password, and ID number and have your Certificates installed on their machine, it's all completely useless without the device to tell them what the current rolling numerical password is.

# Two Factor Authentication

- The rolling second password can be sent either to:
  - A cellphone in the form of an SMS text message
  - A landline telephone
  - A cell phone app with a *Accept/Deny* button
  - A cell phone app that displays the rolling numerical password
  - A USB Yubikey
  - A DUO D100 hardware token that displays the numerical password

# Two Factor Authentication

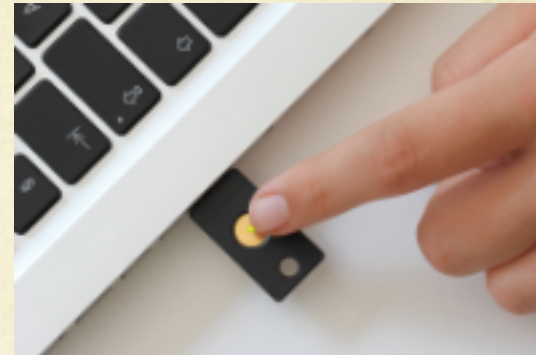
- The Duo cellphone app and landline telephones are the easiest to use once they're set up. The Duo cellphone app can receive a push notification that allows the user to accept or decline access. The landline telephone will ring the user who then picks up the receiver and presses any random telephone keys to approve authorization.
- The USB Yubikey needs to be set up by your IT person via a special Yubico setup app and then handed to you. The Yubikey must then be connected via a USB port. Move your mouse to the line where the second password is prompted then press the Yubikey button to automatically paste the password into the second password box.



# Two Factor Authentication



Plug Yubikey into the computer's USB port



Press Yubikey button to paste code into the second password line on the browser

Yubikeys are USB tokens that are manufactured by a company called Yubico. This key needs to be set up with Yubico's software by your IT guy and then requires you to plug it into one of your computer's USB ports to function.



# Two Factor Authentication



This is Tom holding the DUO D100 Hardware Token. This hardware token clips to your key chain and works anywhere in the world!



# Two Factor Authentication

- Once you decide on and/or get your DUO authentication device, you must register it with the same browser your certificates are on at <http://duo.mit.edu>
- IS&T recommends that all users register **TWO** devices to be used for two factor authentication. This can be 2 different (eg. cell phone and USB Yubikey, landline phone and D100 hardware token, etc) or the same type of device (eg. 2 D100 hardware tokens).
- To make the request for hardware tokens or USB Yubikeys, call the IS&T Help Desk at 3-1101. The devices are free and they will deliver them to your main office areas.

# Software Updates

- General rule is to do your Windows or Mac OS X operating system updates a week or two AFTER they come out. This gives the company time to work out any bugs.
- Always wait for us to give you the all clear for any iOS or OS X Upgrades ( eg. iOS 7 to iOS 8 or Mac OS 10.8 to 10.9, etc.)
- Office Updates are generally always safe. It's ok to do those when they come out.
- Always do Flash and Adobe Reader PDF updates.

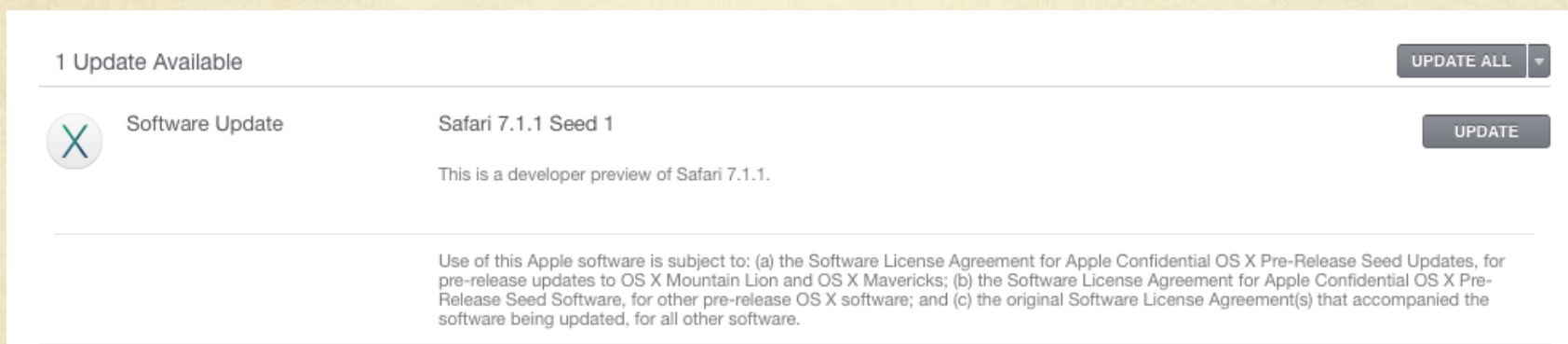


# Don't do the free upgrade right away




- There are always bugs with the new UPGRADES.
- Your normal system UPDATES that appear underneath the upgrade banner are safe to do.

# Normal System Updates OK



1 Update Available UPDATE ALL ▾

|   |                 |                     |                     |
|---|-----------------|---------------------|---------------------|
|  | Software Update | Safari 7.1.1 Seed 1 | <span>UPDATE</span> |
|---|-----------------|---------------------|---------------------|

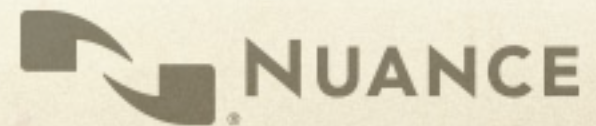
This is a developer preview of Safari 7.1.1.

Use of this Apple software is subject to: (a) the Software License Agreement for Apple Confidential OS X Pre-Release Seed Updates, for pre-release updates to OS X Mountain Lion and OS X Mavericks; (b) the Software License Agreement for Apple Confidential OS X Pre-Release Seed Software, for other pre-release OS X software; and (c) the original Software License Agreement(s) that accompanied the software being updated, for all other software.

- Your normal system UPDATES that appear underneath the upgrade banner in the white boxes are safe to do.

# New OSes Have Bugs

- Software incompatibility with MIT applications as well as pre-existing software you may need. This often results in features not working or random crashes.
- Slow unacceptable hardware performance.
- Slow or buggy web browsing. Often the browser companies need to update their software to make it work correctly.
- Nuance products (Dragon) usually inherently incompatible with new OS versions. They need time to work out the bugs.



# New Hardware can have bugs



(Circa August 2015)

It turns out, Kinesis Advantage keyboards (which have been around a while) won't work with Windows 7 (which has also been around a while) AND new computer hardware that has USB 3 ports.

# Kinesis verified the problem

“It is highly likely that the Intel USB controller you have is the one that won’t support our Advantage keyboard. **It is a problem with the Win7 drivers because the Intel USB chipsets and keyboard work together with Window 8, Linux, and Mac OS X.** We’ve tried to work with Intel to get them to fix it but have not had **success getting them to do so.** Normally a powered hub should be able to accept the Advantage keyboard, even though it has its own hub, but in spite of testing many powered hubs, we haven’t found one that will mask and solve this problem.

If you had an existing keyboard and a new computer that wasn’t compatible, we would suggest converting your keyboard to PS/2 (we could sell you a cable) and then use a PS/2 to USB adapter. This is a clunky solution and you would lose the USB port on the back of the keyboard, so we would never suggest doing this with a new keyboard.

We are working on a new electronic design that will solve this problem, but we don’t know when it will be available (but hopefully this year). Anyway, if you would need to use your new Advantage keyboard on a computer that only has USB 3.0 and Win7, I suggest waiting for the new version or considering an upgrade to Win8.1 when it comes out (assuming Microsoft does a decent job fixing the disaster they created for keyboard/mouse users with Win 8.0).”

# Hackers and Security Research

- Hackers have been around as long as there's been computers.
- For many young hackers, the movie *Wargames* was a popular culture crucible of inspiration.
- Many hackers got their start taking things apart to see how they work.
- White hat hackers who work in security research disclose their findings to the companies and then the general public.
- Their findings spur improvements in security and design changes to keep us safe.

# Hackers and Security Research

"For over two decades DEF CON has been an open nexus of hacker culture, a place where seasoned pros, hackers, academics, and feds can meet, share ideas and party on neutral territory."

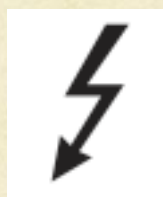
"Our community operates in the spirit of openness, verified trust, and mutual respect."



The image is a screenshot of a PCMag article. At the top, the PCMag logo is on the left, and navigation links for 'NEWS / OPINIONS / FEATURES / DEALS / HOW-TO / BUSINESS / VIDEO / SUBSCRIBE' are on the right. Below this is a secondary navigation bar with 'ALL REVIEWS' and a dropdown arrow, followed by 'LAPTOPS / TABLETS / PHONES / APPS / SOFTWARE / SECURITY'. The article's breadcrumb trail reads 'Home / Reviews / Software / Security / Defcon Hackers to Feds: We Need Some Time Apart'. The main title is 'Defcon Hackers to Feds: We Need Some Time Apart' in a large, bold font. Below the title, it says 'BY CHLOE ALBANESIUS' and 'JULY 11, 2013 03:35PM EST' with a heart icon and '7 COMMENTS'. A short summary follows: 'The controversy over leaked National Security Agency (NSA) documents has prompted the organizers of the Defcon conference to rescind their invitation to federal authorities.' Below the summary are social media share icons for Google+, Facebook, Twitter, and a plus sign, with '13 SHARES' to the left. A circular icon with a green skull and crossbones is positioned to the left of the main text. The main text begins: 'The controversy over leaked National Security Agency (NSA) documents has prompted the organizers of the Defcon conference to rescind their invitation to federal authorities.' This is followed by a paragraph: 'For years, government officials have been among the hackers and security experts on the Defcon agenda. NSA chief Keith Alexander made an appearance at last year's event, while in 2009, Defcon founder Jeff Moss was among the 16 individuals named to the Homeland Security Advisory Council (HSAC).' A quote is then presented: '"For over two decades DEF CON has been an open nexus of hacker culture, a place where seasoned pros, hackers, academics, and feds can meet, share ideas and party on neutral territory," Defcon organizers said on their website. "Our community operates in the spirit of openness, verified trust, and mutual respect."' The final paragraph states: 'But amidst reports of widespread surveillance at the hands of the government, the hackers at Defcon aren't exactly enthusiastic about breaking bread with their federal counterparts this year.'

# Active hardware vulnerabilities

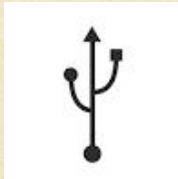
- Thunderbolt adapters (all) through the Option ROMs



Exploit code can be passed through the Option ROM of any TB Adapter to a Mac which (now infected) can then pass the infection on to the Option ROM in another TB adapter.



# Active hardware vulnerabilities



## USB Ports (Aug 2014)

“Connecting devices to computers using a USB port could lead to security breaches.

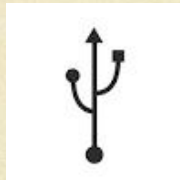
USB technology has been called “critically flawed” by Berlin-based security researchers Karsten Nohl and Jakob Lell.

According to the BBC, the researchers said there is no way to defend against cyber vulnerabilities from USB connected devices.

Karsten Nohl and Jakob Lell said that a USB stick that has been formatted and is completely empty can still contain malware that can infect computers. This flaw can be hidden in any USB-connected device.”

<http://www.computerweekly.com/news/2240226605/USB-connected-devices-present-cyber-vulnerabilities>

# Active hardware vulnerabilities



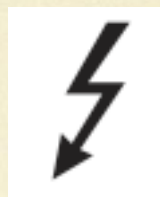
## USB Ports (Oct 2014)

“It’s been just two months since researcher Karsten Nohl demonstrated [an attack he called BadUSB](#) to a standing-room-only crowd at the Black Hat security conference in Las Vegas, showing that it’s possible to corrupt any USB device with insidious, undetectable malware.”

“Like Nohl, Caudill and Wilson reverse engineered the firmware of USB microcontrollers sold by the Taiwanese firm Phison, one of the world’s top USB makers. Then they reprogrammed that firmware to perform disturbing attacks: In one case, they showed that the infected USB can impersonate a keyboard to type any keystrokes the attacker chooses on the victim’s machine. Because it affects the firmware of the USB’s microcontroller, that attack program would be stored in the rewritable code that controls the USB’s basic functions, not in its flash memory—even deleting the entire contents of its storage wouldn’t catch the malware. Other firmware tricks demonstrated by Caudill and Wilson would hide files in that invisible portion of the code, or silently disable a USB’s security feature that password-protects a certain portion of its memory.”

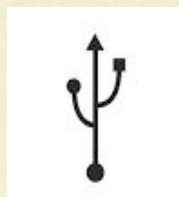
<http://www.wired.com/2014/10/code-published-for-unfixable-usb-attack/>

# Active hardware vulnerabilities



- Use only your own Thunderbolt adapters.
- Do not lend your Thunderbolt adapters with anyone.
- Do not plug anyone else's Thunderbolt adapters into your Mac.

# Active hardware vulnerabilities



- Only use USB devices you have purchased.
- Do not plug in USB devices from anyone else.
- Do not plug any USB device you find “lying around” into your computer.
- Do not loan your USB devices to anyone.

# Sensitive Data

- Massachusetts state law requires MIT safeguard all sensitive data. (Names, social security numbers, addresses, date of birth, credit card info, etc)
- If you use a laptop to access or store sensitive data, the laptop needs to be encrypted.
- We securely erase all machines that are given to us for disposal once the area is done using it.
- Not sure if you have sensitive data on your computer? Identity Finder is available from the IS&T website.

# Knowledge

- Knowledge is power.
- The more you learn from talking to us, searching the web for answers, and personal investigations, the better you will be able to discern what is legit and what isn't and protect yourself against bad people and criminals.
- Don't be afraid to ask questions. Always ask questions.
- There are no dumb questions.

# Protect your stuff



- Your data is the most important thing on your computer.
- Have backups.
- All Mac users should be using **Time Machine**.
- PC Users should be using **Windows Backup**.
- Both of these programs are **DISASTER RECOVERY** solutions and require an external HD to work.

# Your Data is Life



- **Crash Plan** is IS&T's free cloud data backup solution. This solution is a secondary off site backup for your data.
- **Crash Plan** is NOT a disaster recover solution, it is off site data backup. No application or system files are backed up. Files take as long to bring back from the cloud as they take to save up TO the cloud. For users with 50-100 GB of data or more this could take days to a week.
- Remember, **ONLY YOU** can prevent data loss.