



Teaching Cybersecurity in the High School classroom

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NO - we don't teach teens to hack!!



□ We are NOT this

□ NOT what we do



We teach responsibility



□ **THIS** is what we do

□ **We ARE this**



Why teach this in high school?

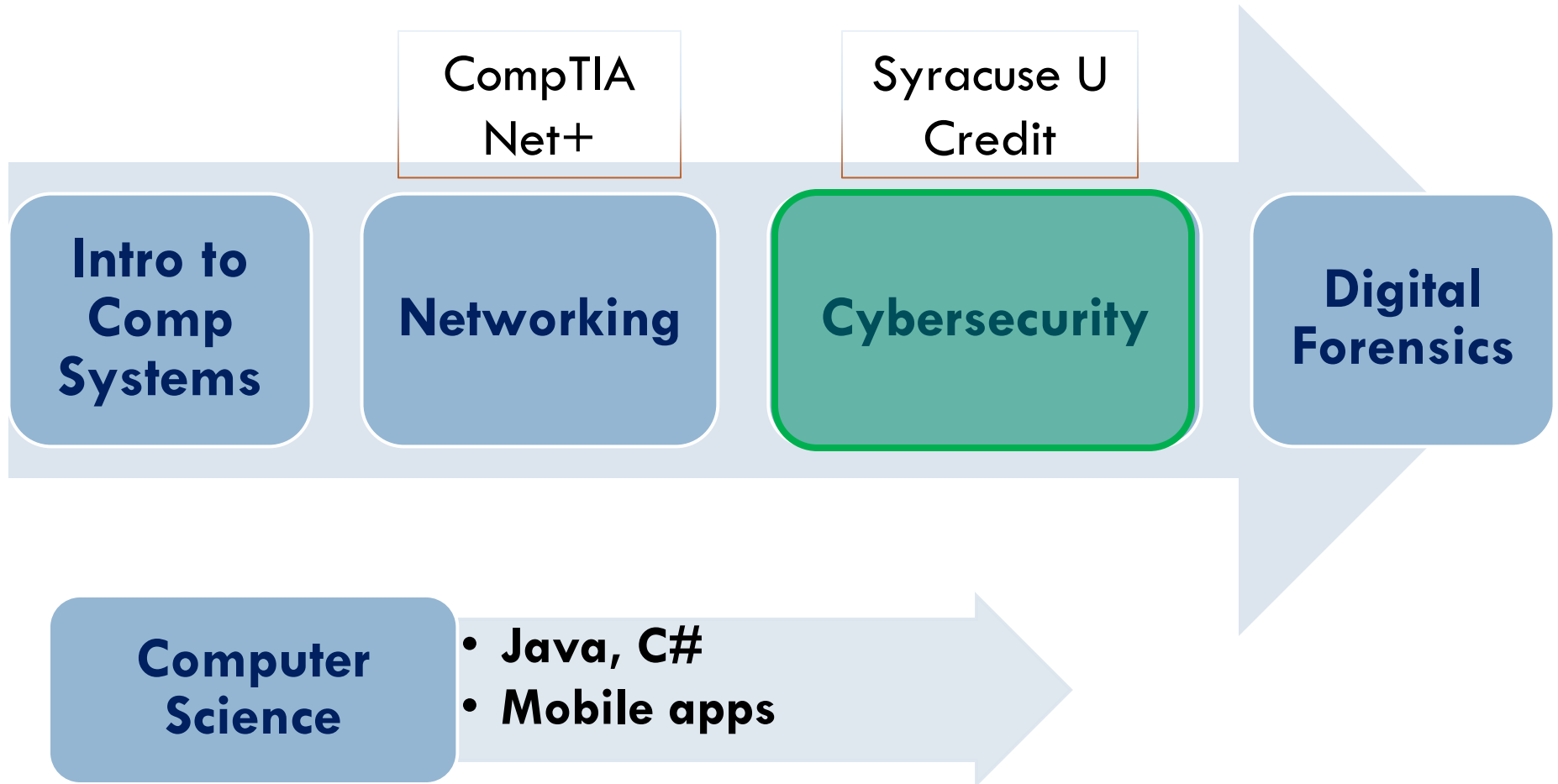
- **Develop a generation with secure computing habits**
- Discover talent and direct towards choosing this as a college major or as a career path
- Need for a cyber workforce

“Everybody in this country should learn how to program a computer... because it teaches you how to think.”

- Steve Jobs

and secure

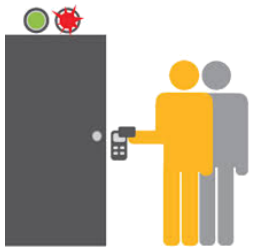
The RBR Cyber learning path



Cybersecurity topics & tools

□ Social Engineering

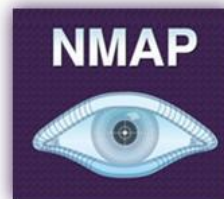
- Phishing, spear phishing, pharming



- Impersonation, piggybacking, shoulder surfing

□ Network Recon

- Whois
- Nmap scans
- OS Fingerprinting



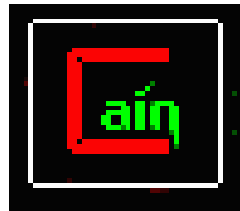
□ Authentication

- Strong Passwords
- Tokens / Biometrics
- Hashing passwords
- CHAP / Kerberos
- RADIUS

Cybersecurity topics & tools

□ Attacks

- Password Cracking
- Man in the Middle
- Hijack / Replay
- IP spoofing
- DOS/DDOS
- DNS poisoning
- WEP & WPA Crack



□ Tool examples

- BackTrack (Kali)
- John the Ripper
- Cain & Abel
- Metasploit
- Kismet & Aircrack



Cybersecurity topics & tools

□ Defensive Techniques

- System hardening
- Patching & Updates
- Firewalls
- IDS / IPS
- Vulnerability Assessment
- Protocol Analyzers



□ Cryptography

- Hashing
- Symmetric
- Asymmetric
- Public Key Infrastructure
- Digital Signatures

Cybersecurity topics & tools



□ **Secure Access**

- Access Control Lists
- IPSEC & VPNs
- SSH / SSL

□ **BCP / Data Recovery**

- Backups
- Hot sites
- RAID



□ **Online attacks**

- Buffer overflows
- Active X
- Cross-site scripting
- SQL Injection
- Fuzzing
- Browser proxies



Digital Forensic Topics

- Drive acquisition & Write blocking & Imaging
- Hashing for file integrity
- Volatile data / memory acquisition
- File systems and Data Recovery
- File Signatures & File Carving
- Steganography
- Network capture analysis
- Metadata analysis



Digital Forensic Tools

- ❑ FTK Imager
- ❑ Volatility
- ❑ Foremost / Scalpel
- ❑ Truecrypt
- ❑ The Sleuth Kit
- ❑ Autopsy
- ❑ Network Miner
- ❑ Exiftool
- ❑ Forensic Toolkit

- ❑ Bulk Extractor
- ❑ OSF Mount
- ❑ And a LOT of LINUX command line tools

```
$DATA (128) Size: No Limit Flags:  
$INDEX_ROOT (144) Size: No Limit Flags: Resident  
$INDEX_ALLOCATION (160) Size: No Limit Flags: Non-resident  
$BITMAP (176) Size: No Limit Flags: Non-resident  
$REPARSE_POINT (192) Size: 0-16384 Flags: Non-resident  
$EA_INFORMATION (208) Size: 8-8 Flags: Resident  
$EA (224) Size: 0-65536 Flags:  
$LOGGED_UTILITY_STREAM (256) Size: 0-65536 Flags: Non-resident  
root@Kali-RBR:~# fls /dev/mapper/truecrypt1  
r/r 40-128-3: 08whales.wav  
r/r 4-128-4: $AttrDef  
r/r 8-128-2: $BadClus  
r/r 8-128-1: $BadClus:$Bad  
r/r 6-128-1: $Bitmap  
r/r 7-128-1: $Boot  
d/d 11-144-4: $Extend  
r/r 2-128-1: $LogFile  
r/r 0-128-1: $MFT  
r/r 1-128-1: $MFTMirr  
r/r 9-128-8: $Secure:$SDS  
r/r 9-144-11: $Secure:$SDH  
r/r 9-144-14: $Secure:$SII  
r/r 10-128-1: $UpCase  
r/r 3-128-3: $Volume
```

Proof of concept

- CompTIA certifications earned by students
 - ▣ 49 Network+ and 30 Security+
- AFA Cyber Patriot Challenge
 - ▣ National Champions 2011
 - ▣ NJ State Champions 2012 & 2013
- NYU-Poly CSAW High School Forensics
 - ▣ First place team 2012, Second Place team 2013
 - ▣ Finalist teams all four years of contest
- Cyber Aces / Net Wars
 - ▣ 1st and 4th place NJ Governor's Cyber Challenge
- Future Business Leaders of America Contests 2013
 - ▣ 2nd place Cybersecurity , 8th place Game Programming



Where are they now

- **Colleges:**

Carnegie Mellon – Stevens – Yale - Georgia Tech

Rochester Institute of Technology – Elon - Rutgers

Virginia Tech – NJIT – Quinnipiac – Emerson

- **Companies:**

Booz Allen - IBM - US Army -Credit Suisse – Google

- Not just majoring in technology - medical, finance, engineering, communications – all these fields will benefit from secure digital habits

What can you do?

- Small – come speak to our students
- Medium – provide a shadowing opportunity or a tour of your facilities
- Large – sponsor a summer internship or mentor a cyberteam
- Huge – entertain candidates for employment
 - our RBR alum are now graduating from colleges and ready to be part of the cyber workforce!

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