Risk in the Workplace

Users

Incident Handling

Graded Assessments

Course Wrap Up

Video: Framing yourself
1 min

Reading: How to Add Google IT Support Certificate to Your Resume and LinkedIn Profile
10 min

Reading: Common Job Search Terms
10 min

Reading: Module 6 Glossary
10 min

Reading: Course 5 Glossary
10 min

Discussion Prompt: Your Learning Journey
10 min

Video: Congratulations!
51 sec

Reading: Information and FAQs about badges
10 min

Practice Quiz: Your Access to Google Job Search Resources
1 question

Ungraded Plugin: Google IT Cert Participant Exit Survey
10 min

Module 6 Glossary

New terms and their definitions: Course 5 Week 6

Data exfiltration: The unauthorized transfer of data from a computer. It's also a very important concern when a security incident happens

Data handling policies: Should cover the details of how different data is classified

Entry point: the act to determine the entry point to figure out how the attacker got in, or what vulnerability the malware exploited

High value data: usually includes account information, like usernames and passwords. Typically, any kind of user data is considered high value, especially if payment processing is involved

Impact: The impact of an incident is also an important issue to consider

PCI DSS: Payment Card Industry Data Security Standard

Penetration testing: The practice of attempting to break into a system or network to verify the systems in place

Principle of least privilege: Helps to ensure that sensitive data is only accessed by people who are authorized to access it

Privacy policies: Oversees the access and use of sensitive data

Recoverability: How complicated and time-consuming the recovery effort will be

Screen lock: A security feature that helps prevent unwanted access by creating an action you have to do to gain entry

Security: It's all about determining risks or exposure understanding the likelihood of attacks; and designing defenses around these risks to minimize the impact of an attack

Severity: Includes factors like what and how many systems were compromised and how the breach affects business functions

Threats & password policies: Protects Data & IP, Data Protection, Infrastructure Defense, Identity Management, and users

Vendor risk review: Questionnaire that covers different aspects of their security policies procedures and defenses

Vulnerability scanner: Detect lots of things, ranging from misconfigured services that represent potential risks, to detecting the presence of back doors and systems

Terms and their definitions from previous weeks

A

Access Control Entries: The individual access permissions per object that make up the ACL

Access Control List (ACL): It is a way of defining permissions or authorizations for objects

Accounting: Keeping records of what resources and services your users access or what they did when they were using your systems

Activation threshold: Triggers a pre-configured action when it is reached and will typically block the identified attack traffic for a specific amount of time

Advanced Encryption Standard (AES): The first and only public cipher that's approved for use with top secret information by the United States National Security Agency

Adware: Software that displays advertisements and collects data

Analyzing logs: The practice of collecting logs from different network and sometimes client devices on your network, then performing an automated analysis on them

Antivirus software: It monitors and analyze things like new files being created or being modified on the system in order to watch for any behavior that matches a known malware signature

Application policies: Defines boundaries of what applications are permitted or not, but they also help educate folks on how to use software more securely

Asymmetric encryption: Systems where different keys are used to encrypt and decrypt

Attack surface: It's the sum of all the different attack vectors in a given system

Attack vector: Method or mechanism by which an attacker or malware gains access to a network or system

Attack: An actual attempt at causing harm to a system

Auditing: It involves reviewing records to ensure that nothing is out of the ordinary

Authentication server (AS): It includes the user ID of the authenticating user

Authentication: A crucial application for cryptographic hash functions

Authorization: It pertains to describing what the user account has access to or doesn't have access to

Availability: Means that the information we have is readily accessible to those people that should have it

B

Backdoor: A way to get into a system if the other methods to get in a system aren't allowed, it's a secret entryway for attackers

Baiting: An attack that happens through actual physical contact, enticing a victim to do something

Bastion hosts or networks: A server used to provide access to a private network from an external network

Binary whitelisting software: It's a list of known good and trusted software and only things that are on the list are permitted to run

Bind: It is how clients authenticate to the server

Biometric authentication: Authentication that uses Biometric data

Block ciphers: The cipher takes data in, places that into a bucket or block of data that's a fixed size, then encodes that entire block as one unit

Botnet: A collection of one or more Bots

Bots: Machines compromised by malware that are utilized to perform tasks centrally controlled by an attacker

Brute force attacks: A common password attack which consists of just continuously trying different combinations of characters and letters until one gets access

C

CA (Certificate authority): It's the entity that's responsible for storing, issuing, and signing certificates. It's a crucial component of the PKI system

Caesar cipher: A substitution alphabet, where you replace characters in the alphabet with others usually by shifting or rotating the alphabet, a set of numbers or characters

CBC-MAC (Cipher block chaining message authentication codes): A mechanism for building MACs using block ciphers

CCMP (counter mode CBC-MAC protocol): A mode of operation for block ciphers that allows for authenticated encryption

Central repository: It is needed to securely store and index keys and a certificate management system of some sort makes managing access to storage certificates and issuance of certificates easier

Certificate fingerprints: These are just hash digests of the whole certificate, and aren't actually fields in the certificate itself, but are computed by clients when validating or inspecting certificates

Certificate Revocation List (CRL): A means to distribute a list of certificates that are no longer valid

Certificate Revocation List (CRL): A means to distribute a list of certificates that are no longer valid

Certificate Signature Algorithm: This field indicates what public key algorithm is used for the public key and what hashing algorithm is used to sign the certificate

Certificate Signature Value: The digital signature data itself

Certificate-based authentication: It is the most secure option, but it requires more support and management overhead since every client must have a certificate

CIA Triad: Confidentiality, integrity, and availability. Three key principles of a guiding model for designing information security policies

Client certificates: They operate very similarly to server certificates but are presented by clients and allow servers to authenticate and verify clients

CMACs (Cipher-based Message Authentication Codes): The process is similar to HMAC, but instead of using a hashing function to produce a digest, a symmetric cipher with a shared keys used to encrypt the message and the resulting output is used as the MAC

Code signing certificates: It is used for signing executable programs and allows users of these signed applications to verify the signatures and ensure that the application was not tampered with

Confidentiality: Keeping things hidden

Correlation analysis: The process of taking log data from different systems, and matching events across the systems

Counter-based tokens: They use a secret seed value along with the secret counter value that's incremented every time a one-time password is generated on the device

Cross-site scripting (XSS): A type of injection attack where the attacker can insert malicious code and target the user of the service

Cryptanalysis: Looking for hidden messages or trying to decipher coded message

Cryptographic hashing: It is distinctly different from encryption because cryptographic hash functions should be one directional

Cryptography: The overarching discipline that covers the practice of coding and hiding messages from third parties

Cryptology: The study of cryptography

Cryptosystem: A collection of algorithms for key generation and encryption and decryption operations that comprise a cryptographic service

D

Data binding and sealing: It involves using the secret key to derive a unique key that's then used for encryption of data

Data information tree: A structure where objects will have one parent and can have one or more children that belong to the parent object

Decryption: The reverse process from encryption; taking the garbled output and transforming it back into the readable plain text

Defense in depth: The concept of having multiple overlapping systems of defense to protect IT systems

Denial-of-Service (DoS) attack: An attack that tries to prevent access to a service for legitimate users by overwhelming the network or server

DES (Data Encryption Standard): One of the earliest encryption standards

Deterministic: It means that the same input value should always return the same hash value

DH (Diffie-Hellman): A popular key exchange algorithm, named for its co-inventors

Dictionary attack: A type of password attack that tries out words that are commonly used in passwords, like password, monkey, football

Distinguished name (DN): A unique identifier for each entry in the directory

Distributed Denial-of-Service (DDoS) attack: A DoS attack using multiple systems

DNS Cache Poisoning Attack: It works by tricking a DNS server into accepting a fake DNS record that will point you to a compromised DNS server

DSA (Digital Signature Algorithm): It is another example of an asymmetric encryption system, though its used for signing and verifying data

Dynamic ARP inspection (DAI): A feature on enterprise switches that prevents certain types of attacks

E

EAP-TLS: One of the more common and secure EAP methods

ECDH & ECDSA: Elliptic curve variants of Diffie-Hellman and DSA, respectively

Eliptic curve cryptography (ECC): A public key encryption system that uses the algebraic structure of elliptic curves over finite fields to generate secure keys

Encapsulating security payload: It's a part of the IPsec suite of protocols, which encapsulates IP packets, providing confidentiality, integrity, and authentication of the packets

Encryption: The act of taking a message (plaintext), and applying an operation to it (cipher), so that you receive a garbled, unreadable message as the output (ciphertext)

Encryption algorithm: The underlying logic or process that's used to convert the plaintext into ciphertext

End-entity (leaf certificate): A certificate that has no authority as a CA

Entropy pool: A source of random data to help seed random number generators

Evil twin: The premise of an evil twin attack is for you to connect to a network that is identical to yours but that is controlled by an attacker. Once connected to it, they will be able to monitor your traffic

Exploit: Software that is used to take advantage of a security bug or vulnerability

Extensible authentication protocol (EAP over LAN, or EAPOL): A standard authentication protocol

F

Fail to ban: A common open source flood guard protection tool

File-based encryption: Guarantees confidentiality and integrity of files protected by encryption

FIPS (Federal Information Processing Standard): The DES that was adopted as a federal standard for encrypting and securing government data

Flood guards: Provide protection against DoS or Denial of Service Attacks

Forward secrecy: This is a property of a cryptographic system so that even in the event that the private key is compromised, the session keys are still safe

Four-Way Handshake: It is designed to allow an AP to confirm that the client has the correct pairwise master key in a WPA-PSK setup without disclosing the PMK

Frequency analysis: The practice of studying the frequency with which letters appear in ciphertext

Full disk encryption (FDE): It is the practice of encrypting the entire drive in the system

G

GTK (Groupwise Transient Key): A temporal key, which is actually used to encrypt data

H

Hacker: Someone who attempts to break into or exploit a system

Half-open attacks: A way to refer to SYN floods

Hash collisions: Two different inputs mapping to the same output

Hashing (Hash function): A type of function or operation that takes in an arbitrary data input and maps it to an output of a fixed size, called a hash or a digest

HMAC (Keyed-Hash Message Authentication Codes): It uses a cryptographic hash function along with a secret key to generate a MAC

Host-based firewalls: Protects individual hosts from being compromised when they're used in untrusted and potentially malicious environments

HTTPS: Hypertext Transfer Protocol Secure is a secure version of HTTP that ensures the communication your web browser has with the website is secured through encryption

Hubs: Devices that serve as a central location through which data travels through; a quick and dirty way of getting packets mirrored to your capture interface

I

Identification: The idea of describing an entity uniquely

Implicit deny: A network security concept where anything not explicitly permitted or allowed should be denied

Injection attacks: A common security exploit that can occur in software development and runs rampant on the web, where an attacker injects malicious code

Integrity: Means keeping our data accurate and untampered with

Intermediary (subordinate) CA: It means that the entity that this certificate was issued to can now sign other certificates

Intrusion detection and intrusion protection systems (IDS/IPS): Operates by monitoring network traffic and analyzing it

IP source guard (IPSG): It can be enabled on enterprise switches along with DHCP snooping

IPsec (Internet Protocol security): A VPN protocol that was designed in conjunction with IPv6

Issuer Name: This field contains information about the authority that signed the certificate

K

Kerberos: A network authentication protocol that uses tickets to allow entities to prove their identity over potentially insecure channels to provide mutual authentication

Kerckhoff's principle: A principle that states that a cryptosystem, or a collection of algorithms for key generation and encryption and decryption operations that comprise a cryptographic service should remain secure, even if everything about the system is known except for the key

Key escrow: Allows encryption key to be securely stored for later retrieval by an authorized party

Key length: It defines the maximum potential strength of the system

Key signing parties: Organized by people who are interested in establishing a web of trust, and participants perform the same verification and signing

Key size: It is the total number of bits or data that comprises the encryption key

Key: A crucial component of a cipher, which introduces something unique into your cipher

Keylogger: A common type of spyware that's used to record every keystroke you make

L

L2TP (Layer 2 Tunneling Protocol): It is typically used to support VPNs

Lightweight Directory Access Protocol (LDAP): An open industry-standard protocol for accessing and maintaining directory services; the most popular open-source alternative to the DAP

Logic bomb: A type of Malware that's intentionally installed

Logs analysis systems: They are configured using user-defined rules to match interesting or atypical log entries

M

MACs (Message Authentication Codes): A bit of information that allows authentication of a received message, ensuring that the message came from the alleged sender and not a third party masquerading as them

Malware: A type of malicious software that can be used to obtain your sensitive information or delete or modify files

MD5: A popular and widely used hash function designed in the early 1990s as a cryptographic hashing function

Meddler in the middle (formerly known as Man in the Middle): An attack that places the attacker in the middle of two hosts that think they're communicating directly with each other

MIC (Message Integrity Check): It is essentially a hash digest of the message in question

Monitor mode: It allows to scan across channels to see all wireless traffic being sent by APs and clients

Multifactor authentication (MFA): A system where users are authenticated by presenting multiple pieces of information or objects

N

Network hardening: Is the process of securing a network by reducing its potential vulnerabilities through configuration changes, and taking specific steps

Network separation (network segmentation): A good security principle for an IT support specialists to implement. It permits more flexible management of the network, and provides some security benefits. This is the concept of using VLANs to create virtual networks for different device classes or types

Network software hardening: Includes things like firewalls, proxies, and VPNs

Network time protocol (NTP): A network protocol used to synchronize the time between the authenticator token and the authentication server

NIST: National Institute of Standards and Technology

Normalization: It's the process of taking log data in different formats and converting it into a standardized format that's consistent with a defined log structure

O

OAuth: An open standard that allows users to grant third-party websites and applications access to their information without sharing account credentials

OES (Operating Encounter Mode): It turns a block cipher into a stream cipher by using a random seed value along with an incrementing counter to create a key stream to encrypt data with

One-time password (OTP) tokens: Another very common method for handling multifactor

One-time password (OTP): A short-lived token, typically a number that's entered along with a username and password

OpenID: An open standard that allows participating sites known as Relying Parties to allow authentication of users utilizing a third party authentication service

Organizational units (OUs): Folders that let us group related objects into units like people or groups to distinguish between individual user accounts and groups that accounts can belong to

P

Packet sniffing (packet capture): the process of intercepting network packets in their entirety for analysis

Pairwise Transient Key (PTK): It is generated using the PMK, AP nonce, Client nonce, AP MAC address, and Client MAC address

Password attacks: Utilize software like password crackers that try and guess your password

Password salt: Additional randomized data that's added into the hashing function to generate the hash that's unique to the password and salt combination

PBKDF2 (Password Based Key Derivation Function 2): Password Based Key Derivation Function 2

PGP (Pretty Good Privacy) encryption: An encryption application that allows authentication of data along with privacy from third parties relying upon asymmetric encryption to achieve this

Phishing attack: It usually occurs when a malicious email is sent to a victim disguised as something legitimate

Physical tokens: They take a few different forms, such as a USB device with a secret token on it, a standalone device which generates a token, or even a simple key used with a traditional lock

PIN authentication method: It uses PINs that are eight-digits long, but the last digit is a checksum that's computed from the first seven digits

Ping flood: It sends tons of ping packets to a system. If a computer can't keep up with this, then it's prone to being overwhelmed and taken down

PKI system: A system that defines the creation, storage and distribution of digital certificates

Platform key: It's the public key corresponding to the private key used to sign the boot files

Port mirroring: Allows the switch to take all packets from a specified port, port range, or the entire VLAN and mirror the packets to a specified switch port

Post-fail analysis: Investigating how a compromise happened after the breach is detected

Pre-shared key: It's the Wi-Fi password you share with people when they come over and want to use your wireless network

Promiscuous mode: A type of computer networking operational mode in which all network data packets can be accessed and viewed by all network adapters operating in this mode

Proxy: Can be useful to protect client devices and their traffic. They also provide secure remote access without using a VPN

Pseudo-random: Something that isn't truly random

Public key authentication: A key pair is generated by the user who wants to authenticate

Public key signatures: Digital signature generated by composing the message and combining it with the private key

R

RA (Registration Authority): It is responsible for verifying the identities of any entities requesting certificates to be signed and stored with the CA

Rainbow table attacks: To trade computational power for disk space by pre-computing the hashes and storing them in a table

Rainbow tables: A pre-computed table of all possible password values and their corresponding hashes

Random numbers: A very important concept in encryption because it avoids some kind of pattern that an adversary can discover through close observation and analysis of encrypted messages over time

Ransomware: A type of attack that holds your data or system hostage until you pay some sort of ransom

RC4 (Rivest Cipher 4): Asymmetric stream cipher that gained widespread adoption because of its simplicity and speed

Remote attestation: The idea of a system authenticating its software and hardware configuration to a remote system

Remote Authentication Dial-in User Service (RADIUS): A protocol that provides AAA services for users on a network

Reverse proxy: A service that might appear to be a single server to external clients, but actually represents many servers living behind it

Risk mitigation: Understanding the risks your systems face, take measures to reduce those risks, and monitor them

Risk: The possibility of suffering a loss in the event of an attack on the system

Rogue Access Point (AP) Attack: An access point that is installed on the network without the network administrator's knowledge

Rogue DHCP server attack: An attacker can hand out DHCP leases with whatever information they want by deploying a rogue DHCP server on your network, setting a gateway address or DNS server, that's actually a machine within their control

Root certificate authority: They are self signed because they are the start of the chain of trust, so there's no higher authority that can sign on their behalf

Rootkit: A collection of software or tools that an admin would use

RSA: One of the first practical asymmetric cryptography systems to be developed, named for the initials of the three co-inventors: Ron Rivest, Adi Shamir and Leonard Adleman

S

Screen lock: A security feature that helps prevent unwanted access by creating an action you have to do to gain entry

Secure boot protocol: It uses public key cryptography to secure the encrypted elements of the boot process

Secure channel: It is provided by IPsec, which provides confidentiality, integrity, and authentication of data being passed

Secure element: It's a tamper resistant chip often embedded in the microprocessor or integrated into the mainboard of a mobile device

Secure Shell (SSH): A secure network protocol that uses encryption to allow access to a network service over unsecured networks

Security information and event management systems (SIEMS): Form of centralized logging for security administration purposes

Security keys: Small embedded cryptoprocessors, that have secure storage of asymmetric keys and additional slots to run embedded code

Security through obscurity: The principle that if no one knows what algorithm is being used or general security practices, then one is safe from attackers

Self-signed certificate: This certificate has been signed by the same entity that issued the certificate

Serial number: A unique identifier for their certificate assigned by the CA which allows the CA to manage and identify individual certificates

Session hijacking (cookie hijacking): A common meddler in the middle attack

Session key: The shared symmetric encryption key using TLS sessions to encrypt data being sent back and forth

SHA1: It is part of the secure hash algorithm suite of functions, designed by the NSA and published in 1995

Shannon's maxim: It states that the system should remain secure, even if your adversary knows exactly what kind of encryption systems you're employing, as long as your keys remain secure

Single Sign-on (SSO): An authentication concept that allows users to authenticate once to be granted access to a lot of different services and applications

Social engineering: An attack method that relies heavily on interactions with humans instead of computers

Software signing certificate: Trust mechanism where a software vendor can cryptographically sign binaries they distribute using a private key

Spear phishing: Phishing that targets individual or group - the fake emails may contain some personal information like your name, or the names of friends or family

Spoofing: When a source is masquerading around as something else

Spyware: The type of malware that's meant to spy on you

SQL Injection Attack: An attack that targets the entire website if the website is using a SQL database

SSL 3.0: The latest revision of SSL that was deprecated in 2015

SSL/TLS Client Certificate: Certificates that are bound to clients and are used to authenticate the client to the server, allowing access control to a SSL/TLS service

SSL/TLS Server Certificate: A certificate that a web server presents to a client as part of the initial secure setup of an SSL, TLS connection

StartTLS: It permits a client to communicate using LDAP v3 over TLS

Steganography: The practice of hiding information from observers, but not encoding it

Stream ciphers: It takes a stream of input and encrypts the stream one character or one digit at a time, outputting one encrypted character or digit at a time

Subject Public Key Info: These two subfields define the algorithm of the public key along with the public key itself

Subject: This field contains identifying information about the entity the certificate was issued to

Substitution cipher: An encryption mechanism that replaces parts of your plaintext with ciphertext

Symmetric key algorithm: Encryption algorithms that use the same key to encrypt and decrypt messages

SYN flood: The server is bombarded with SYN packets

T

TACACS+: It is a device access AAA system that manages who has access to your network devices and what they do on them

Tailgating: Gaining access into a restricted area or building by following a real employee in

Tcpdump: It's a super popular, lightweight command-line based utility that you can use to capture and analyze packets

Threat: The possibility of danger that could exploit a vulnerability

Ticket granting service (TGS): It decrypts the Ticket Granting Ticket using the Ticket Granting Service secret key, which provides the Ticket Granting Service with the client Ticket Granting Service session key

Time-based token (TOTP): A One-Time-Password that's rotated periodically

TKIP (Temporal Key Integrity Protocol): To address the shortcomings of WEP security

TLS 1.2 with AES GCM: A specific mode of operation for the AES block cipher that essentially turns it into a stream cipher

TLS 1.2: The current recommended revision of SSL

TLS Handshake: A mechanism to initially establish a channel for an application to communicate with a service

TPM (Trusted Platform Module): This is a hardware device that's typically integrated into the hardware of a computer, that's a dedicated crypto processor

Transport mode: One of the two modes of operations supported by IPsec. When used, only the payload of the IP packet is encrypted, leaving the IP headers untouched

Trojan: Malware that disguises itself as one thing but does something else

Trusted execution environment (TEE): It provides a full-blown isolated execution environment that runs alongside the main OS

Tunnel mode: One of the two modes of operations supported by IPsec. When used, the entire IP packet, header, payload, and all, is encrypted and encapsulated inside a new IP packet with new headers

Tunnel: It is provided by L2TP, which permits the passing of unmodified packets from one network to another

U

U2F (Universal 2nd Factor): It's a standard developed jointly by Google, Yubico and NXP Semiconductors that incorporates a challenge-response mechanism, along with public key cryptography to implement a more secure and more convenient second-factor authentication solution

Unbind: It closes the connection to the LDAP server

Username and password authentication: Can be used in conjunction with certificate authentication, providing additional layers of security

V

Validity: This field contains two subfields, Not Before and Not After, which define the dates when the certificate is valid for

Version: What version of the X.509 standard certificate adheres to

Viruses: The best known type of malware

VPN (Virtual Private Network): A secure method of connecting a device to a private network over the internet

VPNs: Commonly used to provide secure remote access, and link two networks securely

Vulnerability: A flaw in the system that could be exploited to compromise the system

W

Web of trust: It is where individuals instead of certificate authorities sign other individuals' public keys

WEP (Wired Equivalent Privacy): First security protocol introduced for Wi-FI networks

Wireshark: It's another packet capture and analysis tool that you can use, but it's way more powerful when it comes to application and packet analysis, compared to tcpdump

Worms: They are similar to viruses except that instead of having to attach themselves onto something to spread, worms can live on their own and spread through channels like the network

WPA (Wi-fi protected access): Designed as a short-term replacement that would be compatible with older WEP-enabled hardware with a simple firmware update

WPA2 Enterprise: It's an 802.1x authentication to Wi-Fi networks

WPS (Wifi Protected Setup): It's a convenience feature designed to make it easier for clients to join a WPA-PSK protected network

X

802.1X with EAP-TLS: Offers arguably the best security available, assuming proper and secure handling of the PKI aspects of it

802.1x: It is the IEEE standard for encapsulating EAP or Extensible Authentication Protocol traffic over the 802 networks

X.509 standard: It is what defines the format of digital certificates, as well as a certificate revocation list or CRL

XTACACS: It stands for Extended TACACS, which was a Cisco proprietary extension on top of TACACS

Z

0-Day Vulnerability (Zero Day): A vulnerability that is not known to the software developer or vendor, but is known to an attacker