

### Acronyms

3DES	AAA	ABAC	ACL	AD	AES	AES256	AH
AI	AIS	ALE	AP	API	APT	ARO	ARP
ASLR	ASP	ATT&CK	AUP	AV	BASH	BCP	BGP
BIA	BIOS	BPA	BPDU	BSSID	BYOD	CA	CAPTCHA
CAR	CASB	CBC	CASB	CBT	CCMP	CCTV	CERT
CFB	CHAP	CIO	CIRT	CIS	CMS	CN	COOP
COPE	CP	CRC	CRL	CSA	CSIRT	CSO	CSP
CSR	CSRF	CSU	CTM	CTO	CVE	CVSS	CYOD
DAC	DBA	DDoS	DEP	DER	DES	DHCP	DHE
DKIM	DLL	DLP	DMARC	DNT	DNS	DNSSEC	DoS
DPO	DRP	DSA	DSL	EAP	ECB	ECC	ECDHE
ECDSA	EDR	EFS	EIP	EOL	EOS	ERP	ESN
ESP	ESSID	FACL	FDE	FIM	FPGA	FRR	FTP
FTPS	GCM	GDPR	GPG	GPO	GPS	GPU	GRE
HA	HDD	HIDS	HIPS	HMAC	HOTP	HSM	HSMaaS
HTML	HTTP	HTTPS	HVAC	IaaS	IAM	ICMP	ICS
IDEA	IDF	IdP	IDS	IPS	IEEE	IKE	IM
IMAP4	IoC	IoT	IP	IPS	IPSec	IR	IRC
IRP	ISA	ISFW	ISO	ISP	ISSO	ITCP	IV
KDC	KEK	L2TP	LAN	LDAP	LEAP	MaaS	MAC
MAM	MAN	MBR	MD5	MDF	MDM	MFA	MFD
MFP	ML	MMS	MOA	MOU	MPLS	MSA	MS-CHAP
MSP	MSSP	MTBF	MTTF	MTTR	MTU	NAC	NAT
NDA	NFC	NFV	NGFW	NG-SWG	NIC	NIDS	NIPS
NIST	NOC	NTFS	NTLM	NTP	OCSP	OID	OS
OAI	OSINT	OSPF	OT	OTA	OTG	OVAL	OWASP
P12	P2P	PaaS	PAC	PAM	PAP	PAT	PBKDF2
PBX	PCAP	PCI DSS	PDU	PE	PEAP	PED	PEM
PFS	PGP	PHI	PII	PIN	PIV	PKCS	PKI
PoC	POP	POTS	PPP	PPTP	PSK	PTZ	PUP



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### Acronyms (cont)

QA	QoS	RA	RAD	RADIUS	RAID	RAM	RAS
RAT	RC4	RCS	RFC	RFID	RIPEMD	ROI	RPO
RSA	RTBH	RTO	RTOS	RTP	S/MIME	SaaS	SAE
SAML	SCADA	SCAP	SCEP	SDK	SDLC	SDLM	SDN
SDP	SDV	SED	SEH	SFTP	SHA	SIEM	SIM
SIP	SLA	SLE	SMB	SMS	SMTP/S	SNMP	SOAP
SOAR	SoC	SOC	SPF	SPIM	SQL	SQLi	SRTP
SSD	SSH	SSID	SSL	SSO	STIX	STP	SWG
TACACS+	TGT	TKIP	TLS	TOTP	TPM	TSIG	TTP
UAT	UDP	UEBA	UEFI	UEM	UPS	URI	URL
USB	USB OTG	UTM	UTP	VBA	VDE	VDI	VLAN
VLSM	VM	VoIP	VPC	VPN	VTC	WAF	WAP
WEP	WIDS	WIPS	WORM	WPA	WPS	XaaS	XSRF

### POST EXAM BRAIN DUMP

#### PBQs

Know how to configure a RADIUS server, WiFi server, and a client machine with PKI, WPA2 and current best security practices

Be familiar with the linux kernel and how to identify how attacks are taken out on there

what security measures can be taken on specific network devices to enhance security

What tech can be applied to different network devices (web server, database, domain controller))

Review attack types and their indicators

#### General

Port numbers and their protocols, only common ones are mentioned and just review them. It can make some of the other questions easier as well.

different methods of "preventative" and the like, what physical security measures are the most effective

differences between SOAR and SIEM, Other acronyms to review: CVSS,LDAP, SPI, SoC, API

CASB, other cloud computing concepts (what it takes to move an organization to the cloud, availability, BCP, edge and fog computing))

review linux kernel for directory traversals, CSFR,



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### POST EXAM BRAIN DUMP (cont)

Tip: when taking the exam, flag questions that are worded weirdly and go back to them later and try to rewrite the question yourself. This is what I had to do for like 8 questions

Best cryptography practices and types to use based on specific scenarios, understand how PKI and PSK works, Tokenization vs hashes

Tip: most "scenarios" seemed to start with "\_\_\_\_\_ works at \_\_\_\_\_ organization and is updating/removing/hardening", so familiarize yourself with business related terms

Review GDPR, ISO, NIST, the diamond intrusion analysis method, and Diffe

Best practices for implementing secure work from home networks and remote desktop accessing

My final score was 759 the second time I took it, 723 the first

**DISCLAIMER:** This is not a word for word description of the exam and every exam is different

[Braindumps.com](https://braindumps.com) This website has some "very very similar" questions as to what I had on this exam

### Exam Objectives

Attacks, Threats, and Vulnerabilities (24%)	1.1-1.8
Architecture (21%)	2.1-2.8
Implementation (25%)	3.1-3.9
Operations and Incident Response (16%)	4.1-4.5
Governance, Risk, and Compliance (14%)	5.1-5.6

36 Objective Tasks, each with various subsections.



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### 1.1 SE Attacks

**Phishing** a way to trick people into giving up sensitive info, usually through fake links. prevent with email

filtering

**Smishing**

**Vishing**

**Spam/SPIM**

**Spear phishing**

**Whaling**

**Prepending**

**Reconnaissance**

**Watering Hole Attack**

**Influence Campaigns**

**Reasons of Effectiveness** authority, intimidation, consensus, scarcity, familiarity, trust, urgency

#### Terms without Definitions

dumpster diving, shoulder surfing, pharming, tailgating, eliciting information, identity fraud, invoice scams, credential harvesting, impersonation, hoax, typo squatting, pretexting,

### 1.2 Analyze Attack Indicators

**Malware** Ransomware

Trojan

Worm

PUPs

Logic Bomb

RAT

Rootkit

cryptomalware

**Pass Attacks** spraying

### 1.2 Analyze Attack Indicators (cont)

dictionary

brute force

online v offline

Rainbow Table

**Physical** skimming

**AI** Training Data

**Cryptographic** birthday

collision

downgrade

#### Cloud-based v. on prem

##### Terms w/o Definitions

**Malware:** fileless virus, command and control, bots, spyware, keyloggers, backdoor

**Password Attacks:** plain text, unencrypted

**Physical Attacks:** USB, malicious flash drive, card cloning

### 1.3 Indicators of App Attacks

Privilege Escalation

XSS

Injects

Pointer/object Dereference

Buffer Overflows

Error Handling

Race Conditions

Imprope Input Handling

Replay Attack

Integer Overflow

Request Forgeries

API Attacks

SSL Stripping

Driver Manipulation

Pass the Hash

##### Terms w/o Definitions

resource exhaustion, memory leak



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### 1.4 Network Attacks

Wireless	Evil Twin
	Rogue Access Point
	Bluesnarfing
	Bluejacking
	Disassociation
	RFID
	NFC
	IV

### On-path

Layer 2	ARP poisoning
	MAC poisoning

### DNS Poisoning

DDoS	OT, Network, App
------	------------------

Malicious Code	VBA
----------------	-----

PS, Python, Bash

Macros

Terms w/o Definition

MAC cloning, domain hijacking, URL redirection, domain reputation

### 1.5 Threat Vectors

Actors and Threats	APT
--------------------	-----

Auth Hackers

Unauth Hackers

Semi-auth

Shadow IT

Attributes of Actors	Internal or external threats, level of experience/capability, resources, funding, intent
----------------------	--

### 1.5 Threat Vectors (cont)

Vectors	Direct access, wireless, email, supply chain, social media, cloud, removable media
---------	--

Threat Intel	OSINT
--------------	-------

### Sources

Proprietary

CVE Databases

AIS

Research Sources	Conferences, academic journals, RFC, local industry, social media, threat feeds
------------------	---

TTP

Terms w/o Definitions

insider threats, state actors, hacktivists, script kiddies, criminal syndicates

dark web, IoC, sharing centers, predictive analysis, threat maps, code repos

### 1.6 Security Concerns

There are security concerns with each of the sections below. The concerns depend on industry, implementation, and time, along with other factors. The objective is to explain the security concerns associated with everything below

Cloud based v on prem	<b>Cloud-</b> can be hacked, default must be changed, availability <b>On-prem-</b> physical, can be stolen, human errors
-----------------------	--

General Concerns	open permissions, unsecure root accounts, errors, weak encryption, unsecure protocols, default settings, open ports and services
------------------	--

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### 1.6 Security Concerns (cont)

Thirs Party Risks vendor management, supply chain, outsourced code, data storage

Impacts of Bad Security data loss/breaches/exfiltration, identity theft, financial, reputation, availability loss

Terms w/o Definition  
zero-day, patch management, legacy platforms

### 1.7 Techniques

Threat Hunting Intel fusion  
threat feeds  
manuever

Vulnerability Scans non/credentialed

non/intrusive  
application

CVE  
Config review

SIEM Security info and event management  
Packet Capture, review reports, data inputs  
User behavior analysis  
sentiment analysis  
security monitoring  
log collectors

SOAR Security, orchestration, automation, and response

Terms w/o Definition  
false positives/negatives, log reviews, web application, network

### 1.8 Pen Test Techniques

Passive/Active Recon drones, war flying/driving, footprinting, OSINT

Exercise Types red, blue, white, or purple team

Pen Testing un/known environment, partially known environment, lateral movement, privilege escalation, cleanup, bug bounty, pivoting



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### 2.1 Sec Conference

EXplain the importance of security concepts in an enterprise environment

Config diagrams, baseline  
Management

Data sovereignty

Data Protection DLP, masking, encryption, at rest, in motion, in processing  
tokenization

Geography

SSL transport

API

Site resiliency (hot, warm, cold))

Honeypots/flies/nets

DNS Sinkhole

Fake telemetry

### 2.2 Cloud Concepts

Acronyms to review: IaaS, PaaS, SaaS, XaaS, CSP, MSP/MSSP, API, SDN, SDV, VM, SIAM

Fog computing cloud that is close to IoT data, midpoint, distributed cloud architecture, extends the cloud, distribute data and processing

no latency, no bandwidth reqs, minimizes security concerns

Edge computing IoT systems, edge server, close to the use, process the data on the device, increased internet speed

### 2.2 Cloud Concepts (cont)

Thin client basic app usage, runs on remote server, VDI, local device, minimal operating system on the client, big network requirement

Containers Standardized, physical infrastructure with one OS with container software, isolated process, image, standardized and lightweight, secure

Monolithic client database code, one big application, codebase is so large it is hard to do maintenance, not as fast

Microservices and APIs are the more efficient version of monolithic

Microservice-s/APIs API gateway manages communication through gateway to different microservices that leads to a data base, the API is the "glue", scalable, resilient, security and compliance

Serverless architecture FaaS, applications are remote and autonomous, removes the OS, it is a stateless compute container, event triggered (available as needed), third party



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### 2.2 Cloud Concepts (cont)

Transit Gateway	VPC, public cloud that has resources, VPC is controlled by the transit gateway aka "cloud router," connects through VPN to VPCs
Virtualization	one physical piece of hardware, runs different OSs on one device Vm sprawl avoidance
	vm escape protection
Virtualization Security	avoid VM sprawl because no one knows where VMs live, detail provisioning so everyone knows where it is (track), VM is self-contained
	VM escape attack type can control host
HaaS/IaaS	outsourcing equipment, must manage internally
SaaS	easier and on-demand
PaaS	middle ground, no HVAC, no maintenance team, no direct control, building blocks
Cloud Design	elasticity, on-demand, global access,
Data Protection	resource policies,
SIAM	most providers are different, SIAM integrates diverse providers for a unified view
IaaS	can be deployed at will, describes app instances in code,

### 2.2 Cloud Concepts (cont)

SDN	central mngmt, vendor neutral, no human intervention, Agile, directly programmable
	to secure, use Internal firewall to connect all servers, use an IPS between internet and internal net, devices are software based
SDV	must see traffic to secure data, monitoring, SIEM, firewalls are able to be implemented
	data is encapsulated and encrypted
Terms w/o Definitions:	
public, community, hybrid, infrastructure as code, on prem v off prem, service integration, multisourcing, control pane (config), data plane (performing)	

### 2.3 App Dev/Deploy

Must be able to summarize these concepts	
De/Provisioning	
QA	
Integrity Measurement	
Secure Coding	normalization, stored procedures
	obfuscation/camouflage
Server v Client Side	
OWASP	
Compiler v Binary	
Elasticity	
Scalability	
Terms w/o Definitions:	
memory management, version control,	



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### 2.4 Authen. and Author.

Authentication methods	directory services
	federation
	attestation
	TOTP, HOTP, SMS, token key, static codes, push notifications/phone calls
	smart cards
Biometrics	fingerprint, retina, iris, facial, voice, gait analysis, efficacy rates, false acceptance/rejection, CER
MFA	Factors: something you know, have, or are
	Attributes: somewhere you are, something you can do or exhibit, someone you know
AAA	

### 2.5 Cybersecurity

Redundancy	RAID
	Load Balancers on a network
	UPS
Backup types	Full
	Incremental
	Snapshot
	Differential
	Tape

### 2.5 Cybersecurity (cont)

Non-persistence	revert to known state, last known good config, high availability, restoration order
Diversity	tech, vendors, crypto, controls
Terms w/o Definitions: generator, dual supply, managed power, PDUs, multipath, NIC, replication (SAN), disk, copy, NAS, cloud, image, online v offline, offsite storage	

### 2.6 Sec Implications

Acronyms to Remember	<b>REVIEW THEIR IMPLICATIONS AND SCENARIOS</b> SCADA, IoT, VoIP, HVAC, MFP, RTOS, SoC, SIM cards
Embedded systems	arduino, raspberry pi, FPGA
SCADA/ICS	facilities, industrial, manufacturing, energy, logistics
IoT	sensors, smart devices, wearables, facility automation, weak defaults
specialized systems	medical
	vehicles, aircraft
	Smart Meters
Constraints for embedded and specialized systems	power, compute, network, crypto, inability to patch, authentication, range, cost, implied trust
Terms w/o Definitions: drones, surveillance systems, 5G, narrow band	



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### 2.7 Physical Sec

Air Gap

Screened subnet (DMZ)

Secure Areas

Secure Data burning, shredding, pulping, pulverizing, destruction degaussing, third-party

Faraday cages

Sensors motion, noise, proximity, moisture, cards, temp

Terms w/o Definitions:

bollards, AC vestibules, badges, alarms, signage, cameras, motion detection, CCTV, industrial camo, Personnel, Locks (biometric/physical), USB data blocker, fencing, lighting, fire suppression, drones, visitor logs

### 2.8 Cryptographic Concepts

Common Use Cases Low Power devices

low latency

high resiliency

supporting confidentiality

supporting integrity

obfuscation support

non-repudiation support

Blockchain public ledgers

Limitations speed, size, weak keys, time, longevity, predictability, reuse, resource and security constraints

entropy

Modes of Operation Unauthenticated

Authenticated

Counter

### 2.8 Cryptographic Concepts (cont)

Steganography Audio

Video

Image

Quantum communications

computing

Post-Quantum

Other Concepts digital signatures

key length

salting

hashing

key exchange

elliptic-curve

perfect forward secrecy



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### 3.1 Implement Secure Protocols

Implement secure protocols based on a scenario

Protocol	Definition	Use Cases
DNSSEC	Secure DNS, validates info and integrity through public key cryptography	sign DNS certificate
SSH	Secure shell provides encrypted client-server terminal, replaced telnet/FTP	secure terminal communication
S/MIME	Used with email, Secure/Multi-purpose Internet Mail Extensions, public/private key pair is required	PKI manages these keys
SRTP	Secure Real Time Protocol, keeps convos private, adds encryption, uses AES, uses Hash based message	ex: HMAC SHA1
LDAP	Lightweight Directory Access Protocol (X.500 written by International Telecommunications Union)	

### 3.1 Implement Secure Protocols (cont)

	protocol for read/writing dir over an IP network, uses TCP/IP	ex: LDAP can access active directory
LDAPS	uses SSL, secure LDAP	
SASL	provides authentication using client certificates	
FTPS	uses SSL for encryption over FTP client	NOT THE SAME AS SFTP
SFTP	SSH FTP, SSH used for encryption, can ls dir, manipulate files	
POP/IMAP	Used with email,	Use a STARTTLS extension to encrypt POP3 with SSL or use IMAP w/SSL
NTP	no security, classic	used in DDoS as amplifiers
NTPSec	secure version of NTP	
SSL/TLS	Used with email,	always encrypted with browser emails



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### 3.1 Implement Secure Protocols (cont)

SSL (Secure Sockets Layer), TLS (Transport layer security) is the newer version of SSL		
HTTPS	private key used on server, symmetric session key transferred using asymmetric encryption	most common form uses public key encryption
		symmetric key gets used during communication
IPsec	OSI Layer 3, public internet, data IS encrypted, anti-replay with encryption	both tunnel ends are secure, very standardized
AH provides integrity, ESP provides encryption		
Tunneling		
ESP		
SNMPv3	SSH encrypts tunnel communication, follows CIA	is asking routers/switches for info from web browser with HTTPS
DHCP	servers must be authorized in AD, no secure version of DHCP	routing/switching

### 3.1 Implement Secure Protocols (cont)

DHCP snooping, MAC spoofing, no built in security, rogue DHCP servers are a security issue but can be minimized through trusted interfaces on switches and only allowing distribution from trusted interfaces	
prevent DHCP client DoS starvation attacks with a limited number of MAC addys per interface	
Antivirus, Firewalls, anti-malware	auto updates, constant, always check for encryption/integrity checks to inform firewall configurations
<b>Use cases can include, voice and video, time sync, email, file transfer, directory services, routing and switching, DNR(Domain Name Resolution), Net address allocation, and subscriptions</b>	



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### 3.2 Host/App Sec

Implement these based on a scenario

Secure coding practices:

Type	Scenario	Solution
Endpoint Protection	trojans worms and viruses are stopped	Antivirus
	stops spyware/ransomware/fileless	Antimalware
	allows to detect a threat without or with signatures and can use behavioral analysis, can investigate and respond	EDR
	OSI app layer, can block/allow, examine encrypted data	NGFW
	HIDS uses log files to detect, HIPS can block known attacks and uses signatures, hashes, and behavioral analysis	HIPS/HIDS
	allow/block incoming or outgoing app traffic	Host-based firewall

### 3.2 Host/App Sec (cont)

Boot Integrity with Bootloader	BIOS, will use secure boot, protects the BIOS and public key to protect BIOS update with digital signature check, verifies boot loader	UEFI
	device provides central management server with all bootloader info from chain of trust. The report will compare with trusted v not trusted	Attestation
Various Boot Levels (Chain of Trust)	not wanting to lose contact with a system, perfect to get in, rootkits work, UEFI	Secure Boot
	bootloader verifies signature of OS kernel	Trusted Boot
	allows us to measure if any changes occurred, measurements stored in TPM as a hash from previous two processes	Measured Boot
Database	breaches can be expensive, compliance issues, continuity of business is important	



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### 3.2 Host/App Sec (cont)

replacing sensitive data like a SSN with a different, totally random number. ex: tap to pay, NOT HASHING OR ENCRYPTING

Tokenization

adding random data to a hash to secure it further

Salting

one way, ex: passwords, fixed length

Hashing

Application Security

occurs when info is going in, normalization

input validation

info stored on computer from browsers, tracks temp info, personalization, session mangmt, sensitive info is NOT supposed to store info

cookies

secure headers are added to web server configuration, restricts browsers, helps prevent XSS attacks

Headers

### 3.2 Host/App Sec (cont)

app code is signed by developer, assymetric encryption, trusted CA signs developers public key

code signing

SAST for static code analysis, can easily find vulnerabilities(can have false positives).

Static v  
Dynamic  
Code  
Analysis

dynamic analysis, random data put into an app, time and CPU resource heavy, try CERTBFF, negative testing, attack type,

Fuzzing

Hardening

minimizing attack survice, removing all possible entry points, can be based on compliance, CIS, SANS, NIST

possible entry points, close all except required ports, used with NGFW, use nmap

Open  
Ports

FDE, ex: Bitlocker,

Disk  
encryption



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### 3.2 Host/App Sec (cont)

system stability, security fixes, Patch  
emergency used for zero day management  
attacks

TPM trusted platform modules, used in Secure Boot  
junction with HSM

Terms w/o Definitions:

allow/block list, sandboxing, FDE, SED, Hardware root of trust,  
registry, auto update, third party services

### 3.3 Secure Net Design

Implement secure network designs based on scenarios

Design Type	Terms	Definition	Scenarios
Load Balancing	active/active		
	passive/active		
	Virtual IP		
Segmentation	VLAN		
	DMZ		
	Extra or Intranet		
VPN	split tunnel v full tunnel		
	SSL/TLS		
	HTML5		
	L2TP		
DNS			
Port Security	snooping		
Network Appliances	jump servers		
	forward proxy		
	reverse proxy		

### 3.3 Secure Net Design (cont)

NIDS/NIPS

HSM

Aggregators

Firewalls

ACL

App v host v virtual

Port Scanning

### 3.4 Wireless Security

Remember to review how to install and configure wireless security settings

**Cryptographic Protocols** WPA2

WPA3

CCMP

SAE

**Authentication Tools** EAP

PEAP

EAP-FAST

EAP-TLS

EAP-TTLS

IEEE 802.1x

RADIUS

**Methods** PSK, open, WPS, captive portals

**Installations** site surveys, heat maps, WiFi analyzers,  
channel overlaps, WAP, ap security



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### 3.5 Mobile Solutions

Connection Methods	cellular, wifi, bluetooth, infrared, USB, PTP, GPS, RFID
	NFC
MDM	remote wipes, geofencing, geolocation, screen locks, push notifications, passwords and pins
	application management
	content management
	Biometrics
	full device encryption
	containerization
	storage segmentation
Enforcement and monitoring...	monitor third parties
	rooting
	sideloading
	custom firmware
	OTA
	geotagging
	Hotspot
Deployment Models	BYOD, CYOD, COPE, VDI

#### Terms w/o Definitions:

context-aware authentication, carrier unlocking, UEM, MAM, Android, Camera use, SMS, external media, USB OTG, microphone, GPS

### 3.6 Cloud Cybersecurity

Controls	High availability, resource policies, secrets management, auditing
Storage Controls	permissions, encryption, replication, high availability
Network Controls	Virtual Networks
	Public/private subnets
	Segmentation
	API Inspection
Compute Controls	Sec groups, dynamic resource allocation, instance awareness, VPC endpoint, container security
Solutions	CASB, app security, SWG, Firewalls <i>consider for firewalls cost, segmentation</i>
	Third party

### 3.7 Account Management

Identity Tools	IdP, Attributes, Certificates, Tokens, SSH Keys, Smart Cards
Account Types	user, shared, generic, guest, service
Account Policies	Password complexity, history, and reuse prohibiting
	Network location, geofencing, geotagging
	access policies, time based logins, account audits, permissions, lockout, disablement



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### 3.8 Authn/Author Solutions

Authentication management	keys, vaults
	TPM, HSM, knowledge-based
Authentication/-Authorization	EAP, SHAP, PAP, RADIUS, 802.1x, SSO, SAML, TACACS+
	Kerberos
Access Control Schemes	ABAC, MAC, DAC
	rule or role based, conditional, privilege access management

### Recommended Resources

Comptia Objectives List (Free)	Sec+ 691 Exam Cram (Book, \$40)
Professor Messer(Free, Videos)	601 Get Certified Get Ahead (Book, \$40)
LinkedIn Learning (1st Month Free)	Official Comptia Study Tools (Books, \$50 USD)
Anki Learning Flashcards (Free)	Practice Tests!
see braindump	

### 3.9 PKI

PKI Types	Definition	Certificate Types	Definition
Key Management		Wildcard	
CA, RA, CRL, OCSP, CSR, CN		Subject Alternative Names	
Expiration		Code Signing	
		Self Signed	
<b>Concepts</b>		Email, User, Root, Domain	
Online v Offline		DER Format	
Stapling		PEM Format	
Pinning		PFX Format	
Trust Model		P12	
Key Escrow		P7B	



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### 4.1 ToolUse

#### Organizational Security

Commands	Function	Tools	Function
tracert		theHarvester	
nslookup up/dig		sn1per	
nmap		Nessus	
ipconf ig/ ifc on fig		Cuckoo	
hping		FTK Imager	
netstat		Win Hex	
netcat		Autopsy	
arp		Wireshark	
route		Memdump	
curl		Powershell, Python, SSH	
dnsenum	last one used for recon	Tcpdump	
head	used for file manipu- lation (FM)	Tcpdump	
tail	FM		
cat	FM		
grep	FM		
chmod	FM		
logger	FM		

Terms w/o Definitions: Data sanitization, dd, password crackers, incident response, OpenSSL

### 4.2 PPP

#### Policies, Processes, and Procedures for IR

IR Process	Preparation
	Identification
	Containment
	Eradication
	Recovery
	Lessons Learned

Attack Frameworks

Cyber Kill Chain

Stakeholder Management

Communication Plan

DRP

BCP

COOP

Retention

Terms w/o Definitions: tabletop, walkthroughs, simulations, diamond model of intrusion analysis, irp

### 4.3 Data Support

Utilize appropriate data sources to support an investigation

SIEM Dashboards sensors, sensitivity, trends, alerts, correlation

Log Files Network, system, app, security, web, DNS, authentication, dump files, VoIP, SIP

syslog

journalctl

NXLog

Bandwidth monitors

Metadata email, mobile, web, file

netflow



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### 4.3 Data Support (cont)

Protocol Analyzer

### 4.4 Mitigation

Reconfiguring Endpoints

Quarantine

Configuration changes alter firewall, MDM, DLP, content filter, cert updates

Isolation, Containment, Segmentation

SOAR playbooks

### 4.5 Digital Forensics

Documentation and Evidence can include video, tags, reports, snapshots, time stamps, event logs, interviews, admissibility

chain of custody

Acquisition order of volatility

use disks, RAM, OS, device type, firmware, snapshots, caches, networks, artifacts

Integrity Hashing, checksums, and provenance

Preservation is crucial

Non-repudation

Counterintelligence

Terms w/o Definitions:  
on prem v cloud, right to audi, data breaches



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### 5.1 Types of Controls

Control Types preventive, detective, corrective, deterrent, compensating, physical

Categories managerial, operational, technical

### 5.2 Regulations

Importance of applicable regulations, standards, or frameworks that impact organizational security posture

Legislation GDPR

National/territory/state laws

PCI DSS

HIPAA

Frameworks CIS

NIST

RMF/CSF

ISO

Cloud

SSAE

Guides OS

Web server

### 5.3 Policies

Personnel Abide by AUP, job rotations, mandatory vacations, separation of duties

least privilege

clean desk, background checks, NDAs, social media analysis, Onboarding, Offboarding, User Training/Role based training

Diverse Training

### 5.3 Policies (cont)

Third Party Risk Management vendors, supply chain, business partners, SLA, MOU, MSA, BPA, EOL, EOSL

Data Classification

Governance

Retention

Credential Policies in reference to... personnel, third party, devices, service accounts, admins

Organizational Policies Change management and control

Asset Management

### 5.4 Risk Management

Acronyms: RTO, RPO, MTTR, MTBF, DRP, SLE, ALE, IP, ARO

Risk types include... external, internal, legacy systems, multiparty, IP theft, and software compliance

Risk Management Strategies Acceptance, Avoidance, Transference, Mitigation

Risk Analysis Control assessments

inherent risk

residual risk

control risk

Qualitative v Quantitative risk

Likelihood of occurrence

Asset Values

SLE, ALE, ARO

Business Impact Analysis RTO, RPO, MTTR, MTBF, DRp

site risk assessment



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### 5.5 Data Security

Consequences to an org when data breaches occur reputation is damaged, identity theft, fines, IP theft

Notifications

Data Types Public

Private

Sensitive

Confidential

Proprietary

PII

Health, Govt, Customer

Financial

Privacy Enhancing Technologies Data minimization

Data masking

tokenization

anonymity

Roles and their Responsibilities Data owners

Data controller

DPO

Info Life Cycle

Terms of Agreement Privacy Notices

### Network Design

**Conduct a risk assessment:** The first step in designing a secure network is to assess the risks to the network and the assets it protects. This includes identifying potential threats, vulnerabilities, and the impact of a security breach. Based on the risk assessment, the security requirements can be identified, and the security design can be developed.

### Network Design (cont)

**Use layered security:** A layered security approach involves implementing multiple layers of defense to protect the network from different types of threats. This includes using firewalls, intrusion detection and prevention systems, antivirus software, encryption, and access controls.

**Secure network infrastructure:** The network infrastructure should be secured by implementing strong passwords, disabling unnecessary services, updating firmware and software, and restricting access to critical network devices. Network devices should also be physically secured to prevent unauthorized access.

**Implement access controls:** Access controls should be implemented to restrict access to sensitive information and resources. This includes user authentication, authorization, and accounting (AAA), role-based access control, and network segmentation.

**Encrypt sensitive data:** Sensitive data should be encrypted both in transit and at rest. This includes using secure protocols such as HTTPS, SSH, and VPNs for data transmission and encryption tools such as BitLocker, VeraCrypt, or LUKS for data storage.

**Train employees:** Security awareness training should be provided to all employees to educate them on security best practices and to reduce the risk of human error.

**Monitor and test the network:** Regular monitoring and testing should be conducted to identify and remediate security vulnerabilities. This includes using network monitoring tools, conducting penetration testing, and reviewing audit logs.

### Encryption and Keys

#### Public vs Private Key



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### Encryption and Keys (cont)

**Public Key:** A public key is a part of the asymmetric encryption algorithm and is made available to anyone who wants to communicate with the owner of the key. It is used to encrypt data, digital signature verification, and establish secure communication channels. The public key can be freely distributed as it does not contain sensitive information. **Private Key:** A private key, on the other hand, is the other half of the asymmetric encryption algorithm and is kept secret by the owner of the key. It is used to decrypt data, generate digital signatures, and establish secure communication channels. The private key must be kept secure as it contains sensitive information that must not be disclosed to anyone else.

### Asymmetric Keys vs Symmetric Keys

**Symmetric Key:** A symmetric key encryption system uses the same secret key to both encrypt and decrypt the data. The sender and receiver must have the same secret key to communicate securely. The symmetric key encryption system is faster than the asymmetric key encryption system, and it is typically used for bulk data encryption. **Asymmetric Key:** An asymmetric key encryption system uses two keys, a public key, and a private key. The public key is used to encrypt the data, and the private key is used to decrypt it. Anyone can have access to the public key, but the private key is kept secret by the owner. Asymmetric key encryption is slower than symmetric key encryption but provides better security and is typically used for digital signatures, secure key exchange, and establishing secure communication channels. **The main difference between symmetric and asymmetric key encryption is that symmetric key encryption uses the same key to encrypt and decrypt data, while asymmetric key encryption uses two different keys for encryption and decryption. The symmetric key encryption system is faster, while the asymmetric key encryption system is more secure.**

### PBQ Notes from Youtube

- Firewalls and Proxy PBQ** allow web traffic, disallow all traffic from specific IP, ensure implicit deny, port 53 is DNS,
- IDS alert, supposed to be denied on ACL, given diagram. 443 default port for https, NAT, NAPT firewall in use
- 3.3 PBQ** tcp port 22, new inbound rule wizards, use custom, rule can be named SFTP, most groups use third party for FTP,
- PBQ Vincent Humble** multifactor auth characteristics, payload, trojan with keylogger
- cryptographic scenario: **RSA**,  
hash → private key encryption → to create dig sig → alice then attaches DS to og message to deliver to bob (SHE FORGOT TO ENCRYPT THIS) → bob then decrypts og message w/ DS using Alice's **public** key → resulting in the hash of the og message → bob performs hash comparison → the hashes do not match → no trust
- Other Vincent Humble Videos** 601-P1: blowfish cipher, Bcrypt? can lengthen and strengthen keys, longer the key, the longer a file is confidential,



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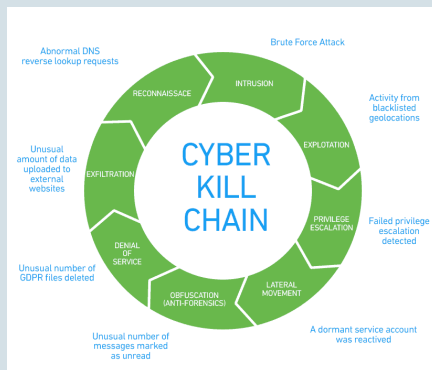
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### PBQ Notes from Youtube (cont)

601-P2: Sim cloning, elliptic curve cryptography, geo requirement for data centers 100 miles?, hybrid, DLP, GPS and WiFi, nonrep & accountability,

601-P3:

### Cyber Kill Chain



Alt text: the cyber kil chain, 8 steps

### Cloud vs On Premises

#### On Cloud vs On Premise

Comparison Chart

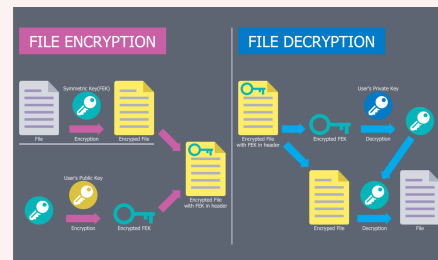
On-Cloud	On-Premise
It is an on-demand computing paradigm wherein a variety of different workloads is hosted in cloud.	The company or organization hosts everything in-house in an on-premise environment.
All the resources are leased from the provider without the additional costs incurred on the user.	On-premise servers require a substantial upfront investment and operating expenses are higher.
The cloud provider handles everything from infrastructure management to program execution.	The company retains their data and is in full control of what happens to it.
It offers limited options when it comes to customization.	The on-premise solutions are increasingly customizable.
In cloud computing, every piece of data is encrypted and protected by several security protocols.	The on-premise servers have their own security risks such as break-ins or weather wreaths.

DB Difference Between.net

Alt text: On cloud vs On premises

Note: This is a VERY strong theme throughout all of the objectives for this exam

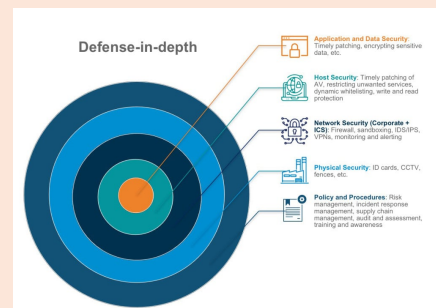
### Encryption (Image)



Alt text: encryption process

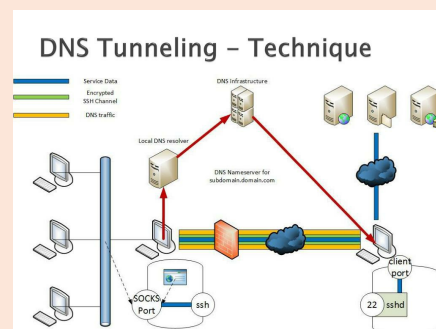
Data preparation, Key generation, Encryption algorithm, transmission of data, decryption

### DiD



Alt Text: Defense in depth methods

### DNS Tunneling



Alt Text: DNS tunneling techniques



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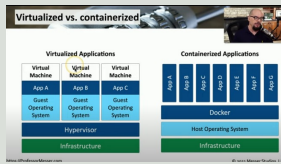
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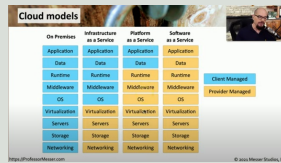
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### Virtualization vs Containerization



Alt text: virtualization vs containerization screenshot from Professor Messer Video

### "As a Service"



Alt text: Cloud services and how they differ from one another



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