$\mathbf{Topics}$	sqlmap + ZAP
Introduction and Information Gathering	Summary3–146
Wy the Web?1–7-10	XSS, SSRF, and XXE
DApplication Assessment Methodologies . 1–11-30	Document Object Model (DOM)4-7-16
Web Application Pen Tester's Toolkit 1–31-37	Cross-Site Scripting (XSS) Primer4–17-31
Interception Proxies	EXERCISE: HTML Injection 4–32-33
BONUS EXERCISE: Testing and Exploiting	XSS Impacts
Heartbleed1–160	BeEF4–43-49
EXERCISE: Configuring Interception Proxies1–	EXERCISE: BeEF4-50-51
56-57	Classes of XSS4-50-73
EXERCISE: Gathering Server Information 1–156-	EXERCISE: DOM-Based XSS 4–74-75
157	Discovering XSS
EXERCISE: Testing HTTPS 1–138-139	XSS Tools
HTTP Syntax and Semantics1–90-124	EXERCISE: XSS
HTTPS and Testing for Weak Ciphers . 1–125-137	AJAX4–101-115
Summary	Data Attacks
Target Profiling	REST and SOAP4–122-130
Open-Source Intelligence (OSINT) 1–58-71	Server-Side Request Forgery (SSRF)4–131-138
Virtual Host Discovery	EXERCISE: Server-Side Request Forgery $4-139$ -
EXERCISE: Virtual Host Discovery1–88-89	140
	XML External Entities (XXE)4–141-150
Content Discovery, Authentication, and Session	EXERCISE: XXE
Testing	Summary
Insufficient Loggin and Monitoring 2–7-11 Spidering Web Applications 2–12-23	
EXERCISE: Web Spidering 2–12-25	CSRF, Logic Flaws, and Advanced Tools
Forced Browsing	Cross-Site Request Forgery5–7-14
EXERCISE: ZAP and fuff Forced Browse 2–33-34	EXERCISE: CSRF5–15-16
Fuzzing	Logic Flaws
Information Leakage	Python for Web App Pen Testers 5–22-38
Authentication	EXERCISE: Python
EXERCISE: Authentication2-77-78	WPScan and ExploitDB
Username Harvesting	EXERCISE: WPScan and ExploitDB 5–44-45
Burp Intruder	Burp Scanner
EXERCISE: Fuzzing with Burp Intruder . 2–97-98	Metasploit
Session Management2–99-114	EXERCISE: Metasploit
EXERCISE: Burp Sequencer2–115-116	EXERCISE: Nuclei/Jenkins 5–88-89
Authentication and Authorization Bypass . 2–117-	When Tools Fail
125	EXERCISE: When Tools Fail
Vulnerable Web Apps: Mutillidaw 2–126-130	Business of Penetration Testing: Preparation5–
EXERCISE: Authentication Bypass2–131-132	99-112
Summary	Business of Penetration Testing: Post Assessment
Appendix: Shellshock	5–113-123
Exploiting Shellshock	Summary
	BONUS EXERCISE: Bonus Challenges 5–124-125
Injection	
HTTP Response Security Controls 3–7-18	Linux, AWS, and Mac Security
Command Injection	Linux Fundamentals 5–3-66
EXERCISE: Command Injection 3–33-34	Linux Security Enhancements and Infrastructure
File Inclusion and Directory Traversal3–35-40	5-67-121
EXERCISE: Local/Remote File Inclusion 3–41-42	Containerized Security5–122-143
Insecure Descrialization	AWS Fundamentals5–144-161
EXERCISE: Insecure Descrialization 3–62-63	AWS Security Controls
SQL Injection Primer	AWS Hardening
Discovering SQL	macOS Security
Exploiting SQLi	*** 11 1
EXERCISE: Error-Based SQLi 3–126-127	Workbook

tcpdump	Static Application Security Testing (SAST) .1–13,
Wireshark	1–16
Aircrack-ng	Testing
Hashcat	Full Knowledge       1–13         Zero-Knowledge       1–13
AppLocker5–95-123	Arachni Scanner1–35
Nmap	ARPANET 1–92
Malicious Software	Assessments
Command Injection	Automated1–20
hping35–154-163	Frameworks
Image Steganography5–164-184	OWASP Web Security Testing Guide 1–22
GNU Privacy Guard (GPG)5–184-203	Penetration Testing Execution Standard
Snort	(PTES)1–22
Process Hacker	Full-Knowledge
NTFS Permissions Reporter 5–245-258	Manual
SECEDIT.EXE5–259-266	Methodology
	Testing Techniques1–22
	Zero-Knowledge
A	Assymetric
11	Attack platform
access control problems1–15	Attack strings
Acunetix Vulnerability Scanner	Auditing
Administrative Pages1–152	Authentication
AJAX4–102-103	Basic
Penetration Testing4–112	Illustrated
proxy4–109	Issues
Spidering2–21	Bearer
$XMLHttpRequest \rightarrow XMLHttpRequest \dots 4-104$	Bypass2–119
Algorithms	Parameter Tampering and Direct Page Access
Assymetric	2-120
DH1–131	SQLi2–121
DSA1–131	Digest
	Digest2-50
ECDH1–131	Illustrated
ECDH1–131 ECDSA1–131	Illustrated       2-57         Issues       2-58
$\begin{array}{cccc} ECDH & & & 1-131 \\ ECDSA & & & 1-131 \\ RSA & & & & 1-131 \end{array}$	Illustrated       2-57         Issues       2-58         Form-based       2-63-64
$\begin{array}{ccc} {\rm ECDH} & & & 1-131 \\ {\rm ECDSA} & & & 1-131 \\ {\rm RSA} & & & 1-131 \\ {\rm Hashing} & & & \end{array}$	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65
ECDH 1–131 ECDSA 1–131 RSA 1–131 Hashing MD5 1–131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA       1-131         SHA384       1-131         Symmetric       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71
ECDH 1-131 ECDSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131         TDES/3DES       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131         TDES/3DES       1-131         American Fuzzy Lop       1-9	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       Attacks       2-123
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131         TDES/3DES       1-131         American Fuzzy Lop       1-9         Application Frameworks       1-151	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       2-123         Bypass       2-122
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131         TDES/3DES       1-131         American Fuzzy Lop       1-9         Application Frameworks       1-151         Application Information Gathering	Illustrated       2-57         Issues       2-68         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       Attacks       2-123         Bypass       2-122         Role Enforcement       2-124
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA256       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131         TDES/3DES       1-131         American Fuzzy Lop       1-9         Application Frameworks       1-151         Application Information Gathering       Spidering         Spidering       2-13	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       2-123         Bypass       2-122
ECDH       1-131         ECDSA       1-131         RSA       1-131         Hashing       MD5       1-131         SHA       1-131         SHA       1-131         SHA384       1-131         Symmetric       AES       1-131         DES       1-131         TDES/3DES       1-131         American Fuzzy Lop       1-9         Application Frameworks       1-151         Application Information Gathering       Spidering         Spidering       2-13         Application Infrastructure       1-150         Application Security       1-10         Assessing       1-12-13	Illustrated       2-57         Issues       2-68         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       2-123         Bypass       2-122         Role Enforcement       2-124         Authorization (ATHZ)       1-28
ECDH 1-131 ECDSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131 DES 1-131 TDES/3DES 1-131 American Fuzzy Lop 1-9 Application Frameworks 1-151 Application Information Gathering Spidering 2-13 Application Infrastructure 1-150 Application Security 1-10 Assessing 1-12-13 Dynamic Application Security Testing (DAST)	Illustrated       2-57         Issues       2-58         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       2-123         Bypass       2-122         Role Enforcement       2-124         Authorization (ATHZ)       1-28         Automated Scanning       1-20
ECDH 1-131 ECDSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131 DES 1-131 TDES/3DES 1-131 TDES/3DES 1-131 American Fuzzy Lop 1-9 Application Frameworks 1-151 Application Information Gathering Spidering 2-13 Application Infrastructure 1-150 Application Security 1-10 Assessing 1-12-13 Dynamic Application Security Testing (DAST) 1-13, 1-17-18	Illustrated       2-57         Issues       2-68         Form-based       2-63-64         Illustrated       2-65         Issues       2-66         Integrated Windows       2-59         Illustrated       2-60         Issues       2-61         OAuth       2-68-71         Openid/Oauth/SAML Authentication       2-67         Schemes       2-50         Authentication (ATHN)       1-28         Authorization       2-123         Bypass       2-122         Role Enforcement       2-124         Authorization (ATHZ)       1-28
ECDH 1-131 ECDSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131 DES 1-131 TDES/3DES 1-131 TDES/3DES 1-131 American Fuzzy Lop 1-9 Application Frameworks 1-151 Application Information Gathering Spidering 2-13 Application Infrastructure 1-150 Application Security 1-10 Assessing 1-12-13 Dynamic Application Security Testing (DAST) 1-13, 1-17-18 Improving 1-12	Illustrated   2-57     Issues   2-58     Form-based   2-63-64     Illustrated   2-65     Issues   2-66     Integrated Windows   2-59     Illustrated   2-60     Issues   2-61     OAuth   2-68-71     Openid/Oauth/SAML Authentication   2-67     Schemes   2-50     Authentication (ATHN)   1-28     Authorization     Attacks   2-123     Bypass   2-122     Role Enforcement   2-124     Authorization (ATHZ)   1-28     Automated Scanning   1-20
ECDH 1-131 ECDSA 1-131 RSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131 DES 1-131 TDES/3DES 1-131 TDES/3DES 1-131 American Fuzzy Lop 1-9 Application Frameworks 1-151 Application Information Gathering Spidering 2-13 Application Infrastructure 1-150 Application Security 1-10 Assessing 1-12-13 Dynamic Application Security Testing (DAST) 1-13, 1-17-18 Improving 1-12 Interactive Application Security Testing (IAST)	Illustrated   2-57     Issues   2-58     Form-based   2-63-64     Illustrated   2-65     Issues   2-66     Integrated Windows   2-59     Illustrated   2-60     Issues   2-61     OAuth   2-68-71     Openid/Oauth/SAML Authentication   2-67     Schemes   2-50     Authentication (ATHN)   1-28     Authorization     Attacks   2-123     Bypass   2-122     Role Enforcement   2-124     Authorization (ATHZ)   1-28     Automated Scanning   1-20     B
ECDH 1-131 ECDSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131 DES 1-131 TDES/3DES 1-131 American Fuzzy Lop 1-9 Application Frameworks 1-151 Application Information Gathering Spidering 2-13 Application Infrastructure 1-150 Application Security 1-10 Assessing 1-12-13 Dynamic Application Security Testing (DAST) 1-13, 1-17-18 Improving 1-12 Interactive Application Security Testing (IAST) 1-13	Illustrated   2-57   Issues   2-58   Form-based   2-63-64   Illustrated   2-65   Issues   2-66   Integrated Windows   2-59   Illustrated   2-60   Issues   2-61   OAuth   2-68-71   Openid/Oauth/SAML Authentication   2-67   Schemes   2-50   Authentication (ATHN)   1-28   Authorization   Attacks   2-123   Bypass   2-122   Role Enforcement   2-124   Authorization (ATHZ)   1-28   Automated Scanning   1-20   Bapp Store   1-53   Bapp Store   1-53   Bapp Store   1-53   Dackdoors   1-15   Bapp Store   1-53   Dackdoors   1-53
ECDH	Illustrated       2–57         Issues       2–58         Form-based       2–63-64         Illustrated       2–65         Issues       2–66         Integrated Windows       2–59         Illustrated       2–60         Issues       2–61         OAuth       2–68-71         Openid/Oauth/SAML Authentication       2–67         Schemes       2–50         Authentication (ATHN)       1–28         Authorization       2–123         Bypass       2–122         Role Enforcement       2–124         Authorization (ATHZ)       1–28         Automated Scanning       1–20         B       backdoors       1–15         BApp Store       1–53         Bash shell       2–137
ECDH 1-131 ECDSA 1-131 RSA 1-131 Hashing MD5 1-131 SHA 1-131 SHA 1-131 SHA256 1-131 SHA384 1-131 Symmetric AES 1-131 DES 1-131 TDES/3DES 1-131 American Fuzzy Lop 1-9 Application Frameworks 1-151 Application Information Gathering Spidering 2-13 Application Infrastructure 1-150 Application Security 1-10 Assessing 1-12-13 Dynamic Application Security Testing (DAST) 1-13, 1-17-18 Improving 1-12 Interactive Application Security Testing (IAST) 1-13	Illustrated   2-57   Issues   2-58   Form-based   2-63-64   Illustrated   2-65   Issues   2-66   Integrated Windows   2-59   Illustrated   2-60   Issues   2-61   OAuth   2-68-71   Openid/Oauth/SAML Authentication   2-67   Schemes   2-50   Authentication (ATHN)   1-28   Authorization   Attacks   2-123   Bypass   2-122   Role Enforcement   2-124   Authorization (ATHZ)   1-28   Automated Scanning   1-20   Bapp Store   1-53   Bapp Store   1-53   Bapp Store   1-53   Dackdoors   1-15   Bapp Store   1-53   Dackdoors   1-53

Illustrated	Sniper2–93
Issues	Issues
berypt2–87	Retesting and Remediation Verification 5–62-63
Bearer Authentication       2-72         BeEF       .4-44-46	Vulnerability Verification         5-61           Proxy         1-47
Issuinng Commands	Repeater
S .	Inspector
Metasploit	Sequencer
Payloads	÷ ,
Best	Spidering2–19
Bing1–65	Target
Broswers	Scope1–44
Bypassing Filters	Site Map
Browser	Site Map - Filter
Browsers	business functionality testing
Authentication Schemes	Business Logic (BUSL)1–28
Required	
Developer Tools4–11	$\mathbf{C}$
Bugtraq1–10	C
BuprSuite Pro Active/Live Scan1–35	0 1 0 4 1
Burp Suite	Cache-Control
Infiltrator1–13	CERN
Request Parameters1–111	Certificate Authorities
Burp Suite Professional1–38, 1–42	Certificate Transparency1–87
AJAX2–21	CEWL
Authenticating2-62	Spidering2-22
Automated Scanning5–47-48	CGI Scripts
Add to Task	CHAOSNET 1–81
Automatic	Checklist1–29
Configuration5–53-56	Cipher Suites
Instantiating Scans5–52	Cipher suites
Live	Testing1–134
Passive	Clickjacking3–15
Push Button	Client Side (CLNT)1–28
Results 5–58-59	Client-side scripting languages3–11
BApp Store	Cloud
Collaborator	Metadata4–137
Blind Exfil	Cloudflare Challenge
Comparer	Code review1–13
Cookie Jar	Command
Crawling/Auditing	HTTP/0.91–95
Dashboard	HTTP/1.01–96
Decoder	HTTP/1.11–97
Discover Content2–28	Command Injection
Engagement Tools	Blind
Cenerage CSRF PoC1–55	Detetion methods
Content Discovery	Exploiting 3–24
Find Commment / Find Scripts1–55	Finding
Search	Command Substitution3–22
Simulate Manual Testing1-55	Commands
Target Analyzer1–55	Base 323–29
Extender	Base64 Encode
	Blind DNS exfil
Grep Payloads	DELETE request
Heads-Up Dispaly	dig (many)
Intruder	dig domain lookup1–80
Battering Ram	DNSRecon1–80
Cluster Bomb2–96	echo prevent CR2-53
Pitchfork	Enumerate HTTP methods 1–153-154
Reflection Tests	Fuff
	1 ul 1

full (AXFR) zone transfer1-75	Coomand Injection
HEAD request1–113	Non-blind3–24
heartbleed.py1–164	Crawling2–14
nc port scan1–142	Cross Origin Resource Sharing (CORS)4–110
nmap https1–135	Headers
OPTIONS request1–116-117	Cross Site Request Forgery (CSRF)
pause using ping3–26	SameSite Cookie Attribute3–12-13
Python - check if installed/version 5–25	Cross-Site Requist Forgery (CSRF)
Python - POST	CSRF vs XSS
Python - PSSL/TLS5–37	Example visualized
Python - Putting it Together5–38	Step 4
Python - retrieve Server header5–24	Tokens
Python3 - install requests5–27	Visualized
reverse DNS	Step 1
Server strings	Step 1
~	
SHA1 hash of session id	Step 3
SQL DB Fingerprinting	ZAP
SQL DB Meta Info queries3–107	Cross-Site Scripting (XSS)
SQL Stacked Queries	Bypassing Broswer Filters4–88
SQLi Binary/Boolean Inference Testing 3–99	Classes
SQLi equivalent string injections 3–96-98	Client and Server4–73
SQLi payload	DOM-Based4-71-72
Strip off equal signs3-29	Reflected
testssl.sh	Stored/Persistent
$\operatorname{Wget}$	Common Injection Contexts4–80
robots off2–18	Existing JS4-83
set proxy2–18	HTML4-81
XSS Evnet Handler	Tag Attributes4–82
XSS Existing JS	cross-Site aspect
XSS HTML img onerror 4–81	Discovery4-77
XSS Tag Attributes	DOM Event Handler Bypass4–86
xxd3–51	Filter
XXE PoC using cURL4-144-146	Bypass/Evasion
ysoserial.jar3-60	Tests 4–84
Commun Vulnerabilities and Exposures (CVE)	Fuzzing4–77
CVE-2014-62692-138	GET -; POST Flaws4–98
CVE-2014-62712-137	HTML Event Handler Injection 4–87
CVE-2014-62772-138	Injection Points4–78
CVE-2014-62782-138	Interception Proxies4–91
CVE-2014-62862-138	Burp Intruder - Reflection Tests 4–92-95
Common Name	PoC Payloads4-35-37, 4-89
Common Vulnerabilities and Exposures (CVE) 2–48	Reflected POST4–97
Concurrency attacks	Reflection Tests
concurrency problems1–15	Session Abuse
Confidentiality	Hijacking
Configuration and Deployment Management (CONF)	URL Encoding
1–28	Burp
Configuration Files	Cross-Site Tracing (XST)1–114
Content Management Systems(CMS)	CRUD
Content Management Systems (CMS)1–131 Content-Security-Policy (CSP)3–17-18	Cryptographic Failures
	v - v -
Defined       3-14         Content-Type       1-109	cryptographic weaknesses
v -	Oryprography (Orrie)1-28
Cookie	
Cookies  Protection 2 8 10	D
Protecting	D
HttpOnly Attribute	Data
SameSite Attribute3–12-13	Attacks
Secure Attribute	Formats
	101111000 I 110

Database	1-17-18, 1-35
Fingerprinting3–105	Scanners
Meta Info3–106-107	Tools1–17-18
Databases	Dynamic web application security scanners 1–32
Decoding1–51	
Default Web Pages1–151	${f E}$
DELETE1-105	L
Developer comments	Easter eggs
Diffie-Helman	EDNS1–74
Dig1–74	Elasticsearch
dig1–80	Electromagnetic Interference (EMI)2–84
Syntax1–81	embedded
Digest Authentication2–56	Encoding1–51
Illustrated	Enrors
Issues2–58	Information Leakage2–44
DirBuster 2–29	Enterprise Resource Management (ERM)5–116
Direct Page Access2–120, 2–125	Entropy2–112
Directory Broswing2–46	Error Handling (ERRH)1–28
Directory Browsing	Exploit Database (EDB)1–10
Google	-
Directory brute forcing2–27	${f F}$
Directory Traversal3–38	Ľ
Disabled functionality2–23	FFuF2-30-32
DNS	Custom Filters2–32
Blind injection	HTTP request
Data exfil	Virtual Host Discovery2–31-32
DNSRecon 1–77, 1–83-84	filter bubble
Document Object Model (DOM)4-8	Fingerprinting1–141
Browser Objects 4–15	Firefox
JavaScript 4–12	URL Encoding
Objects	flawed business logic
Document	Forced Browsing2–27
Window	BurpSuite
Tree	FFuF
Documentation	file extensions
Domain Name System (DNS)1–74	ZAP2–29
Brute Force Scans1–77	Form-based Authentication
EDNS	Illustrated
PTR1–76	Issues
Querying Directly1–75	Fortify WebInspect
Recon Tools1–78	forward proxy
dig	Full Disclosure1–10
DNSRecon	Full-Knowledge
Nmap	FuzzDB
nslookup1–79	Fuzzing2–36
Repositories	Examples
Dnsdumpster.com	Reviewing the Responses
Farsight Security's DNSDB1–85	XSS PoC Payloads
Reverse	ZAP2–41
Zone Transfer	ZA12-41
	$\mathbf{C}$
Dorking         1–67           Dorks         1–66	$\mathbf{G}$
	Gadget classes
Drupal	Generalized Markup Language (GML) 1–91
Drupalgeddon	GET
Got hacked?	URI Query Parameters
Metasploit	Globally Unique Identifiers (GUID)2–103
DuckDuckGo	Google
Dynamic Application Security Testing (DAST)1–13,	Directory Browsing

Google Dorks	Status Code       1–123         Security Headers       3–14-17         Semantics       1–93, 1–101
Governance, Risk, and Compliance (GRC)5–116 Grep1–48	Syntax       1–93         Testing       1–153
H	URI Query Parameters 1–108
Hashing	I
HEAD1–113	idempotent1–105
Heartbleed	Identifying Web Server Components1–151
Effect1–162	Identity Management (IDNT)1–28
Exploit Output1-164	Identity Provider2–67
Hidden links	iframe
High-risk functions	Incident Response2–11
HMAC	Information Gathering1–59
JWT Signature Cracking2–76	Information Gathering (INFO)1–28
HPACK1–98-99	Information Leakage2–44
HTML	CVE search
Injection	Flaws
HTTP Strict Transport Security (HSTS)	Types
HTTPOnly	Insecure Descrialization
HttpOnly3–11	Exploitation       3–48         Java Example       3–49-57
Bypass	RCE
HTTPS	Insecure Direct Object Reference (IDOR)2–125
Authentication	Insecure Directo Object Reference (IDOR)
Cipher Suites1–130	AuthZ attacks2–123
Confidentiality	Integrated Windows Authentication 2–59
Integrity1–130	Illustrated
Public Keys/Certificates and Certificate Authori-	Issues2-61
ties1–132	Integrity1–130
Testing	Integrity hashes
nmap1-135 Version and Cipher Suites1-134	Interactive Application Security Testing (IAST) . 1–13 Interception Proxies
Transmission Security1–127	Configuring
HTTPS Certificates	Zed Attack Proxy (ZAP)1–39
Hypertext Transfer Protocol (HTTP)	Interception proxies
0.91–95	Internet
1.0	Internet Explorer (IE)4–26
1.11–97	Invicti (formerly Netsparker)1–35
3 QUIC1-100	
2	т
History	J
0.9	JavaScript
Request	Browser Objects
Example1–102	DOM Manipulation
Highlights	Frameworks
Methods/Verbs1–105-116, 1–122	AngularJS
Referer1–121	Bootstrap 4–113
User-Agent	jQuery4–113
Response	ReactJS
Cache-Control1–123-124	Injection
Example 1–103-104	Objects
Server	Document
Set-Cookie1–123	Window

	****
Server-side4–115	Web Testing
Web Page Interaction4–16	Method Interchange1–112
JavaScript Object Notation (JSON) 4–118, 119	Method Tampering1–112
Advantages of XML	Methodology1–22
Attacks4–120-121	Micah Hoffman's OSINT MindMap1-61
JSON Web Token (JWT)2-72-73	Michal Zalewski
Issues2–76	MITRE 2–48
Structure	Morris Worm1–92
	Multi-Factor Authentication (MFA)
T/	Bypass3–8
K	Multiplexing1–98
TT 11	Mutillidae
Kali1–33-34	Hints2–129
metapackages 1–34	Reset DB2–130
Update Command1–34	Security Levels2–128
Kerberos2–59, 1–92	mySQL
	,
${f L}$	2.7
L	$\mathbf N$
Link Depth2–14	
LinkedIn Open Networkers (LIONs)	Netcraft Sitereport1–149
Local File Inclusion (LFI)	Network Vulnerability Scanner1–35
Demonstrating Impact	Nikto1–35
Directory Traversal	NIST
Logged Events and Sources	800-30
Logging and Monitoring	Appendix D1–14
Centralized Logs2–10	NIST National Vulnerability Database1–10
Sources	Nmap
Timestamping	DNS NSE Scripts1–82
	nmap1–144-145
logic bombs	Node.js
Logic Flaws	nslookup
Manual Discovery	NTML
Workflow Tampering5–19	NTP2–10
WSTG Guidance5–21	Nuclei Vulnerability Scanner5–82-83
	Command options 5–87
${f M}$	Interactsh
	Nuclei Templates
Mailing Lists	Running Nuclei
Bugtraq1–10	0
Full Disclosure1–10	
Man-in-the-middle (MITM)1–38	0
Manual Assessments1–20	
Manual Inspection and Reviews1–19	OAuth
MD52–87	Flow2-69-71
MediaWiki	Offensive Security
META tags2–15	One-Time Password (OTP)
Metadata	Bypass3–8
Metasploit	Open-Source Intelligence (OSINT)1–60
Auxiliary modules	For Web Application Testers1–62
BeEF5–70-71	Micah Hoffman's OSINT MindMap 1–61
db_import	Search Engines
Drupal5–78	Dorking 1–67
Integration	Google Dorks1-66
Known Vulnerabilities5–73	Key Search Operators1-65
mediawiki_thumb5–93, 5–96	Social Media
Seeding Database	LinkedIn
Spidering and Crawling5–67	SpiderFoot1–71
sqlmatp5–72	Suites
Square 12	S 41005 1 10

OpenID/OAuth/SAML Authentication2–67	Pipelining 1	-98
OpenSSL1–161	Port	
Operational Controls	3306/tcp1-	
Operational Security (OPSEC)1–71	Port Scanning1–142, 1–	151
OPTIONS1–116	Tools	
Origin of Trust4–23	Netcraft1-	143
Other software1–151	Nmap1-	143
Out-of-Band Application Security Testing1–13	Shodan1-	143
OWASP1–24	Zenmap1-	
Top 101–25-26	POST1-	
A08:2021-Software and Data Integrity Faulures	Parameters	
3–44	Post-exploitation	
A09:2021-Security Loggin and Monitoring Fail-	Postman4–	
ures		
	Private key1–	
Cryptographic Failures	Privilege Escalation2–	
Web Application Penetration Testing Methodol-	Profiling1–	
ogy1–27	Property-Oriented Programming3	
Web Security Testing Guide (WSTG) .1–19, 1–22,	Pseudo-random number generators (PRNG) 2–	
1-29	Public key1–	
Information Gathering1–59	Push Button Pen Testing1	
Testing Categories1–27	Push Promise1	-98
Web Application Penetration Testing Methodol-	Python 5	-23
ogy1–27	2 vs. 3	-26
	Availability 5	-25
<del>-</del> -	Basics	-29
P	Data Types and if/elif/else Syntax5	
	for Pentesters	
p0f1–9	Lists and Dictionaries 5	
Paros Proxy1–39	Loops5	
Password hashes	use 3, right? 5	
PATCH1–118	Example5	
PBKDF22–87	Web Libraries5	
Penetration Testing1–17	Requests	
Communication Plans	•	
Debrief Presentation	why writre scripts? 5	-20
Post Assessment Results		
Pre-Engagement Specifics5–105-109	$\cap$	
Backups	<b>₩</b>	
Filtering	quality of protection (gap)	E C
Permission	quality of protection (qop)	
	Qualys SSL Labs1–	
Rules of Engagement	Qualys WAS	
Scope	Quick UDP Internet Connection (QUIC) 1–	100
Source Details		
Test Accounts	D	
Preparation	${f R}$	
Reports5–115		
Alternative Result Formats5–121	Rapid7 AppSpider1	
Appendices	Realm	
Automation 5–122	Recon and Enum1–	141
Executive Summary 5–116-117	Reconaissance	-22
Findings5–119	Referer1–	121
Test Parameters	Relational Databases 3	-67
Skills and Practice	Remote File Inclusion (RFI)	-40
Toolkit	Reporting1	
Penetration Testing Execution Standard (PTES) .1–22	REST4-	
PHP	RESTful API4–	
Expect module4–148	Return Oriented Programming (ROP)	
PHP Data Object (PDO)5–77	Reverse DNS	
Ping3–26	RFC	. 0

2069 Digest OG       2-56         2617 Digest Auth       2-56	Session Analysis	
6749 OAuth2-68	Sessions	
6750 Bearer AuthN2–72	Abuse	.4-38-40
7231book 1114	Hijacking	. 4–39-41
19181–92	Attacks	2–110
19451–94-95	Fixation	2–113
22461-127	Logout and Timeout	
2616	Predictability2	
2617	Confidential	
39861–106, 1–108	Expire	
5246	Identifiers	
5789	Management	
6265	Testing	
6520	Management Principles	
7231	Predicatbility	
72321-97	Theft	
7233	Unpredictable	
7234	Set-Cookie1–122-12	
7235	Shellshock	
7540	fuzzing	
7541	Payloads	
84461–127	Execution and Impact	
91141–100	Injection Explained	
Robot Exclusion Protocol	Visualized	
Robots.txt	Shodan1	
robots.txt	for Pentesters	
Role Enforcement	Port Scanner	
RSA	Side-Channel Attacks	
Runtime Application Self-Protection (RASP) $\dots 1-13$	Practical	
	Timing	
${f S}$	$\begin{array}{c} \operatorname{Practical} \dots \\ \operatorname{Single\ Page\ Applications\ (SPA)} \to \operatorname{JavaScript} \end{array}$	Frame-
$\alpha = \alpha \cdot $	works 4	-113-114
Same Origin Policy (SOP)	Single Sign On (SSO)	
Evading4–109	Integrated Windows Authentication	
XMLHttpRequest4–108	Slow hashing	
Same-Origin Policy (SOP)4–23	SOAP	4–123
Basics4–24	Web Services	-126 - 127
Externally Sourced Scripts4–28-29	SoapUI	4–129
Not Bypassing4–30	SOCMINT	1–68
Requirements4–25	Software Development Lifecycle (SDLC)1-	-17, 1–19
Test Case	Software Engineering Institute (SEI)	
Cookies4–27	Source Code Review	
DOM4-26	Advantages	1–15
SameSite	~	
Scanning1–22	Disadvantages	1 10
Script Injection	Disadvantages	
beript injection 22	SpiderFoot	1–71
SecLists	SpiderFoot	1–71 2–14
	SpiderFoot Spidering AJAX	01-71 $02-14$ $02-21$
SecLists         2-40           Secure Attribute         3-10	SpiderFoot Spidering AJAX Analyzing Results	1-71 $2-14$ $2-21$ $2-23$
SecLists	SpiderFoot Spidering AJAX Analyzing Results BurpSuite	1-71 $2-14$ $2-21$ $2-23$ $2-19$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	SpiderFoot Spidering AJAX Analyzing Results BurpSuite CEWL	$egin{array}{lll} \dots & 1-71 \\ \dots & 2-14 \\ \dots & 2-21 \\ \dots & 2-23 \\ \dots & 2-19 \\ \dots & 2-22 \end{array}$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	SpiderFoot Spidering AJAX Analyzing Results BurpSuite CEWL Command-Line	$ \begin{array}{ccccc} & 1-71 \\ & 2-14 \\ & 2-21 \\ & 2-23 \\ & 2-19 \\ & 2-22 \\ & 2-18 \end{array} $
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	SpiderFoot Spidering AJAX Analyzing Results BurpSuite CEWL Command-Line Manual and Automated	$\begin{array}{lll} \dots & 1-71 \\ \dots & 2-14 \\ \dots & 2-21 \\ \dots & 2-23 \\ \dots & 2-19 \\ \dots & 2-22 \\ \dots & 2-18 \\ \dots & 2-17 \end{array}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	SpiderFoot Spidering AJAX Analyzing Results BurpSuite CEWL Command-Line Manual and Automated Manual vs. Automated	$\begin{array}{lll} \dots & 1-71 \\ \dots & 2-14 \\ \dots & 2-21 \\ \dots & 2-23 \\ \dots & 2-19 \\ \dots & 2-22 \\ \dots & 2-18 \\ \dots & 2-17 \\ \dots & 2-16 \end{array}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	SpiderFoot Spidering AJAX Analyzing Results BurpSuite CEWL Command-Line Manual and Automated Manual vs. Automated ZAP	$\begin{array}{lll} \dots & 1-71 \\ \dots & 2-14 \\ \dots & 2-21 \\ \dots & 2-23 \\ \dots & 2-19 \\ \dots & 2-22 \\ \dots & 2-18 \\ \dots & 2-17 \\ \dots & 2-16 \end{array}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	SpiderFoot Spidering AJAX Analyzing Results BurpSuite CEWL Command-Line Manual and Automated Manual vs. Automated	$\begin{array}{lll} \dots & 1-71 \\ \dots & 2-14 \\ \dots & 2-21 \\ \dots & 2-23 \\ \dots & 2-19 \\ \dots & 2-22 \\ \dots & 2-18 \\ \dots & 2-17 \\ \dots & 2-16 \\ \dots & 2-20 \end{array}$

Key Verbs	Testing Techniques	1–22
Query Modifiers	testssl.sh	1–136
Special Characters	The Tangled Web	1–9
SQL Injection (SQLi)	Threat Modeling	1–13
Auth Bypass2–121	Advantages	1–14
Balancing Act3-78	Disadvantages	1–14
Colmun Numbers	NIST 800-30	1–14
DataType	Tim Berners-Lee	1-9, 1-91
Quotes 3–79	time bombs	1–15
Blind3-87-100	Timing Attacks	2-86
Custom Error Messages3–92-94	Practical	2–88
Database Error Messages3–89-91	Slow Hashing	2–87
Increasing Blindness3–100	Timing-based attack	2–38
Out-of-Band3-102-103	TLS	1 $-127$
Timing Inferences 3–101	Handshake	1-128-129
Blind Data Exfil	Token Authentiction	$\dots\dots 2-72$
Cheat Sheets	Tookkit	$\dots 1-32$
Classes3-85	Tools	
Data Exfil	BeEEF	4–44-46
DB Fingerprinting3-105	Issuing Commands	
DB Meta Info	Payloads	$\dots \dots 4-49$
Determine Data Types3–118	heartbleed.py	1–164
Discovering	Netcraft Sitereport	1–149
DUAL3-115	Next level	5-92
Examples3-72-77	nmap	1–144-145
FROMless SELECT	Shodan	$\dots 1-146-147$
In-Band/Inline3-86	sqlmap	3-130
Exploiting	Auth/Sessions/Proxies	3-135
Stacked Queries	Beyond DB Data Exfil	3 $-142$
Input Locations	DB Data Exfil	3–141
Intro3-65	DB Enum	3–140
NULL3–116	HTTP Headers	3–139
ORDER BY3-117	Initial Targeting	3–134
Origin 3–66	Post Exploitition & Priv Esc	3 $-143$
Payloads3-76	Proxies and Active Sessions	3–136
Binary/Boolean Inference Testing3-99	Riding ZAP/Burp Sessions	
equivalent String Injections 3–96-98	When they fail	$\dots\dots\dots5-91$
Potential Attacks3–123	Research the flaw	
Tools	WPScan	
sqlmap 3–130	Total cost of ownership (TCO)	2–83
UNION3–113-114	TRACE	1–114
UNION+NULL3-117	Transmission Security	
Without Error Messages3–95	Trojans	1-15
Write file -; Shell		
sqlmap		
Data exfil3–120	${f U}$	
Metasploit 5–72	O	
SSL1–127	TT 1: 1 1 1	2.25
Static Application Security Testing (SAST) 1–13, 1–16	Unlinked content	
Status Codes	URI Query Parameters	
Symmetric	User-Agent	
Syntax 1–93	Username Enumeration	
	Results to look for	
<b>T</b> D	Side-Channel Attacks	
1	Username enumeration	
The state of the s	Username Harvesting	
Target	Results to look for	
Profiling	Side-Channel Attacks	
Tautology 3–76	UTC	$2-10$

${f V}$	WWW-Authenticate	2–51
Verb Tampering         1–112           Version Detection         1–151	$\mathbf{X}$	
Virtual Host Discovery	X-Frame-Options	
HTTPS Certificate	Defined	
Vulnerability assessment1–22	XML XML Entermal Entities (XEE)	
vulnerability mailing lists1–10	XML External Entity (XEE)	
Vulnerability Scans1–151	Blind Example	
	Example	
${f W}$	Access URL	
**	Display Local File	4–146
Web Application PenTester's Toolkit 1–32	RCE via PHP	4–148
Web Applications	PoC	$\dots 4-144-145$
web client	SSRF	4–135
Web Security Testing Guide (WSTG)	XML Schema Definition (XSD)	4–145
,	XMLHttpRequest	4–104
Information Gathering	Features and Limitations	4–108
Logic Flaws	Properties and Methods	$\dots 4-105-106$
age	<b>T</b> 7	
Test HTTP Methods	${f Y}$	
Testing for Weak Transport Layer Security .1–132		
WSTG-ATHN-04: Testing for Bypassing Authen-	ysoserial	3–60
tication Schema		
WSTG-CLNT-03:Test for HTML Injection 4–19	7	
WSTG-CONF-04: Review Unreferenced Files for	${f Z}$	
Sensitive Information	ZADA : C	1 05
WSTG-IDNT-04: Testing for Account Enumera-	ZAP Active Scan	
tion	Zed Attack Proxy (ZAP)	
WSTG-INPV-11:Testing for Code Injection:	AJAX	
LFI/RFI3–36	Attack Menu	
WSTG-IVPV-12:Testing for Command Injection	Cookie Jar	
3–20	CSRF Test Form	
WSTG-SESS-05:Testing for Cross-Site Request	Discover Content	
Forgery (CSRF)	Encoding URLs	4-61
Web Servers	Functions	1 41
Web Services	Active Scan	
Pentesting Methodology 4–130	Forced browsing	
Wget2–18	Fuzzing	
Whitehat Sentinel	Spider and AJAX spider	
Wordlists2–36	Fuzzer	
WordPress	Interface	
World Wide Web1–91	Spidering	
World Wide Web (W3)1–94	Zero-Knowledge	,
WPScan5–42-43	Zone Transfer	1–74-75