WebLogic Vulnerabilities
Oracle PeopleSoft Impact

(CVE-2020-14882, CVE-2020-14883, CVE-2020-14750)

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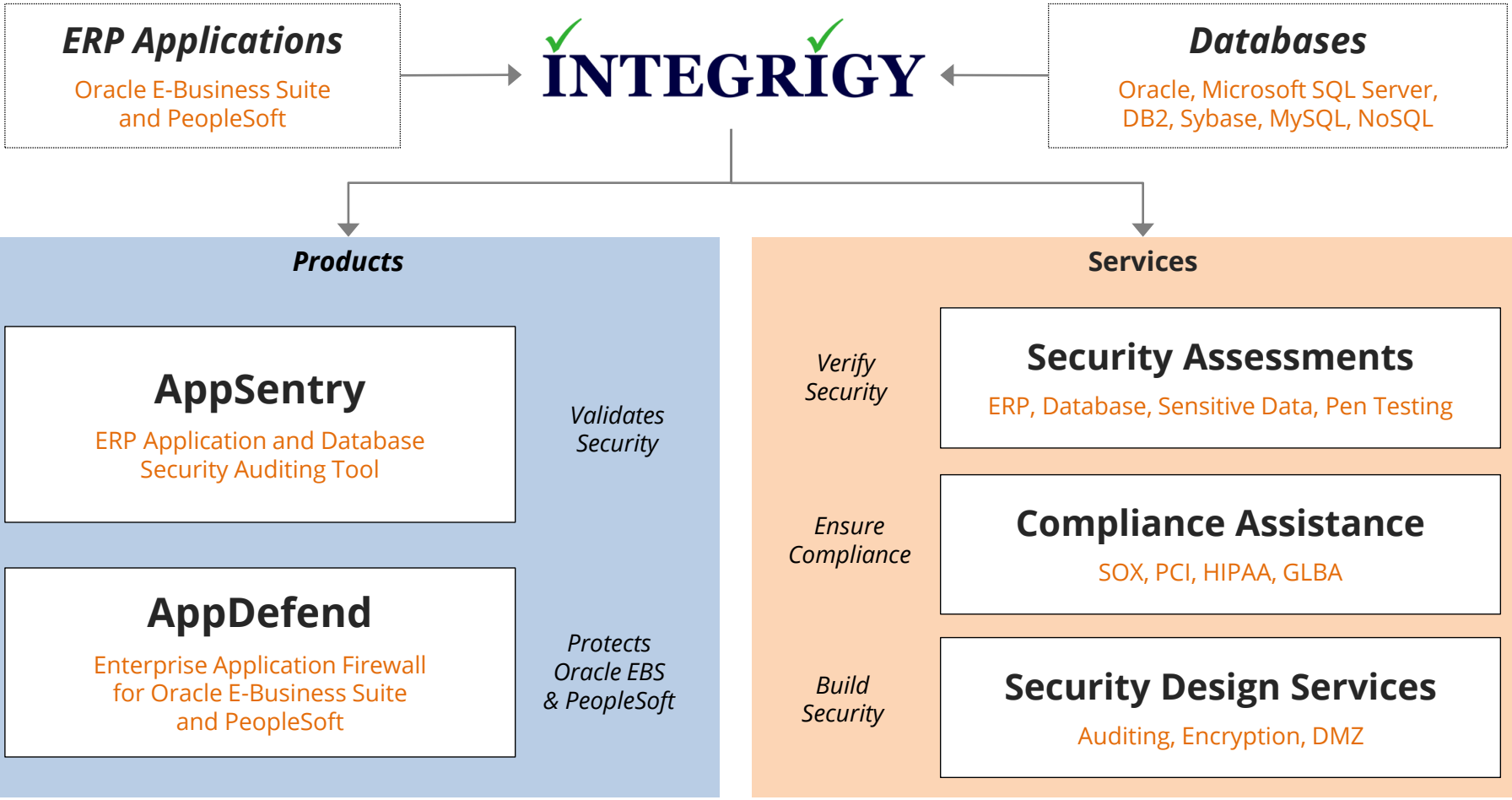
About Integrigy



Integrigy Research Team

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WebLogic Vulnerabilities 2020

	A CVE#	Product	B Component	Protocol	C Remote Exploit Without Auth.?	D CVSS Version 3.1 Risk: Base Score	Attack Vector	Attack Complex	Privs Req'd	User Interact	Scope	Confid	E Inte-grity	Avail	F Supported Versions Affected
Oracle Critical Patch Update (CPU) October 2020															
1	**CVE-2020-14882**	**Oracle WebLogic Server**	**Console**	HTTP	**Yes**	**9.8**	Network	Low	None	None	Un-changed	High	High	High	**10.3.6.0.0, 12.1.3.0.0, 12.2.1.3.0, 12.2.1.4.0, 14.1.1.0.0**
2	**CVE-2020-14883**	**Oracle WebLogic Server**	**Console**	HTTP	**No**	**7.2**	Network	Low	High	None	Un-changed	High	High	High	**10.3.6.0.0, 12.1.3.0.0, 12.2.1.3.0, 12.2.1.4.0, 14.1.1.0.0**
Oracle Security Alert (one-off) November 1, 2020															
3	**CVE-2020-14750**	**Oracle WebLogic Server**	**Console**	HTTP	**Yes**	**9.8**	Network	Low	None	None	Un-changed	High	High	High	**10.3.6.0.0, 12.1.3.0.0, 12.2.1.3.0, 12.2.1.4.0, 14.1.1.0.0**

A CVE (Common Vulnerability Enumeration) is a **standard numbering** of security vulnerabilities – search using Google or Twitter

B These vulnerabilities are limited to the WebLogic **Console** component

C If the vulnerability is remotely exploitable **without authentication**

D CVE Base Score is a scale of 1 to 10 with 10 meaning **entire server** can be compromised

E Attacker can **read and write to the server** and impact availability of the server

F Lists only **supported** versions of WebLogic which are vulnerable – all versions > 10.3.0 are vulnerable

WebLogic Vulnerabilities 2020

CVE-2020-14882	▪ Authorization bypass in WebLogic Console ▪ Classic **path traversal** vulnerability ▪ Full access to WebLogic Console with **no authentication**
CVE-2020-14883	▪ **Remote code execution** (RCE) vulnerability in WebLogic Console ▪ Allows execution of operating system commands by calling specific Java classes ▪ Requires authorization but can be used in combination with CVE-2020-14882
CVE-2020-14750	▪ Fix for CVE-2020-14882 which could be bypassed

CVE-2020-14882 Authorization Bypass URLs

- **WebLogic console URLs are –**
  - **/console/login/LoginForm.jsp** for login page
  - **/console/console.portal** for console once logged in
- **For Oracle E-Business Suite, the WebLogic console is running on a port such as 7001 and the URL would be something like –**
  - http://ps.example.com:8000/console/login/LoginForm.jsp for the login page
  - http://ps.example.com:8000/console/console.portal for the running logged in console
- **WebLogic authorization (login) can be bypassed by changing the URL and perform a path traversal using double encoding –**
  - /console/images/%252E%252E%252Fconsole.portal
  - /console/css/%252E%252E%252Fconsole.portal
  - /console/bea-helpsets/%252E%252E%252Fconsole.portal
- **WebLogic will decode the as follows –**
  - %252E%252E%252F → %2E%2E%2F → ../

Reference: https://owasp.org/www-community/Double_Encoding

CVE-2020-14883 OS Shell Execution

- The security bug is that a page in the WebLogic Console accepts a Java classname as input and executes this class
- Need to simply find a “helper” function that will do something you want, such as execute operating system commands
- There are is at least one very useful “helper” function in WebLogic Console but many others are possible –
  - `com.tangosol.coherence.mvel2.sh.ShellSession`

Example if running WebLogic on Windows –

```
handle=com.tangosol.coherence.mvel2.sh.ShellSession("java.lang.Runtime.
getRuntime().exec('calc.exe');");
```

CVE-2020-14882 Issue and CVE-2020-14750 Fix

The first fix (CVE-2020-14882) is to check for –

/%252E%252E%252F

The issue is that lowercase works too –

/%252e%252e%252f

The second fix (CVE-2020-14750) is to check for –

/%252E%252E%252F

/%252e%252e%252f

WebLogic Vulnerability Demo

WebLogic Vulnerabilities 2020 Security Patches

Step 1 **CVE-2020-14882** **CVE-2020-14883**	WLS PATCH SET UPDATE OCT 2020 See MOS Note ID 1470197.1 *Patch Set Update (PSU) Release Listing for Oracle WebLogic Server (WLS)*
Step 2 **CVE-2020-14750**	WLS OVERLAY PATCH OCT 2020 PSU See MOS Note ID 2724951.1*Security Alert CVE-2020-14750 Patch Availability Document for Oracle WebLogic Server*

CVE-2020-14882 and CVE-2020-14750 Patch Tests

- **To verify the patches are properly applied, attempt to access the Console using the following URLs –**
  - /console/images/%252E%252E%252Fconsole.portal (CVE-2020-14882 test)
  - /console/images/%252e%252e%252fconsole.portal (CVE-2020-14750 test)
- **If 404 is returned, then patches are applied**
- **If the console is displayed (missing images), then patches not applied**
- **If the first URL returns 404 and the second URL returns the console page, then patch for CVE-2020-14750 is missing**

PeopleSoft WebLogic Managed Server Architecture

Single-Server	▪ WebLogic console deployed to **PIA** ▪ Same URL as PeopleSoft application
Multi-Server Domains	▪ WebLogic console deployed to **WebLogicAdmin** ▪ Default port is 9999 and allow all hosts ▪ WebLogic Node Manager runs only on WebLogicAdmin
Distributed Managed Servers	▪ An extension of Multi-Server Domains ▪ WebLogic Node Manager runs on each server

PeopleSoft WebLogic Console

Single-Server	▪ WebLogic console deployed to **PIA** ▪ **Block access to console (/console/*) externally** at load balancer or reverse proxy ▪ Review options to restrict access to console internally ▪ See MOS Note ID 2396558.1 *E-WL: How to Disable T3/T3S Protocol In Weblogic Used By PeopleSoft And Impacts Of Disabling It* Disable t3(s), ldap(s), and IIOP(s)
Multi-Server Domains/ Distributed Managed Servers	▪ As WebLogicAdmin is a separate domain, use domain connection filters to block access to the console WebLogic console → Domain → Security → Filter ▪ Restrict access to http(s), t3(s), ldap(s) and IIOP(s) protocols ▪ See MOS Note ID 2396558.1 *E-WL: How to Disable T3/T3S Protocol In Weblogic Used By PeopleSoft And Impacts Of Disabling It*

WebLogic Connection Filters

- **Defined under WebLogic console → Domain → Security → Filter**
- **Set Connection Filter to weblogic.security.net.ConnectionFilterImpl**
- **Set Connection filter rules like the following**
  - Rules are processed in order
  - Use IP addresses whenever possible to avoid DNS lookups

Allow server

127.0.0.1 * * allow https t3s

<server ip address> * * allow https t3s

Block all other (last rule)

0.0.0.0/0 * * deny http https t3 t3s ldap ldaps iiop iiops

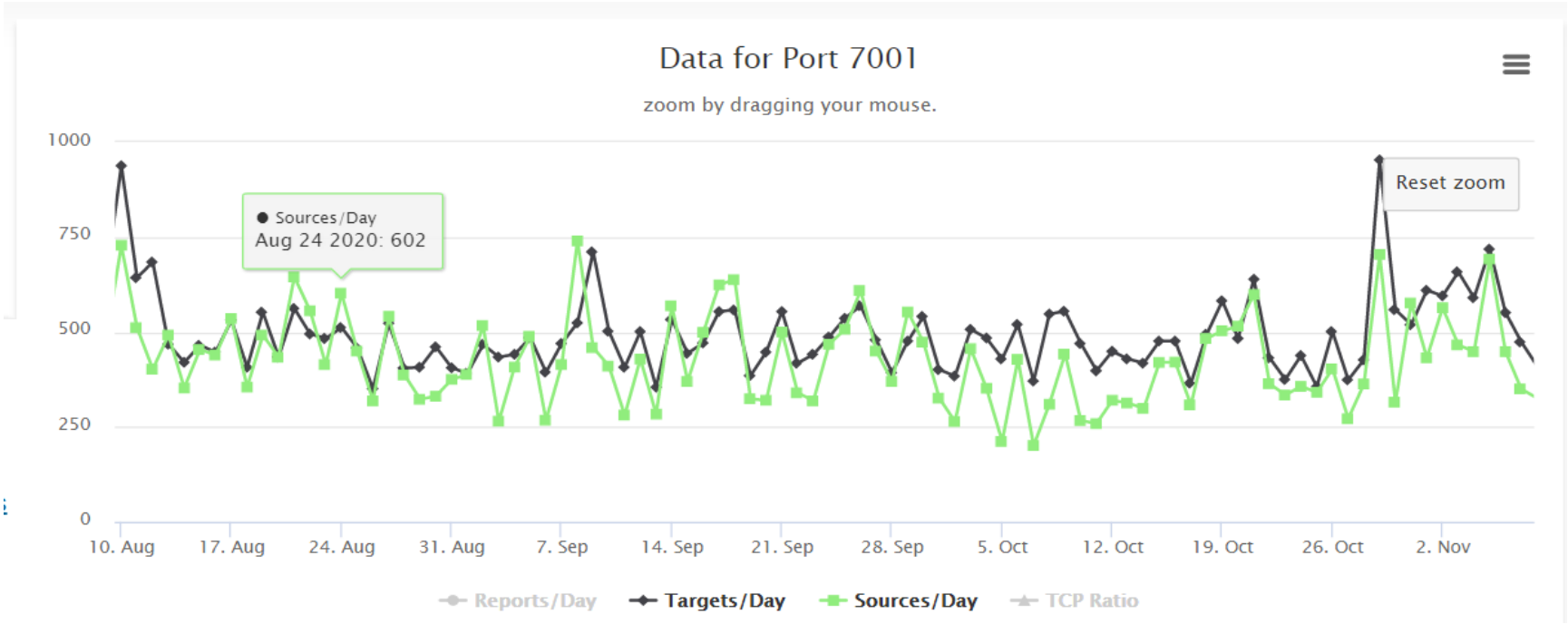
- **If using WLST for scripting, then t3/t3s must be enabled**

Finding WebLogic Servers

- **Attackers actively search for vulnerable servers on the Internet**
  - Use security search engines
  - Crawl the Internet (IP address by IP address)
- **Security search engines allow for searches by server type (WebLogic) and port number (7001)**
  - Shodan – https://www.shodan.io/
  - Censys – https://censys.io/
  - Spyse – https://spyse.com
- **Newer versions of PeopleSoft and Oracle E-Business Suite do not show WebLogic as the server type and should not appear in results**
  - Server string is set to empty since Oracle EBS 12.1.1

WebLogic Attacks and Port 7001

- Internet Storm Center (ISC) tracks through sensors on the Internet scanning for ports and attacks against servers
- There is active scanning for port 7001 and active attacks against using these WebLogic vulnerabilities



Source: https://isc.sans.edu/port.html?port=7001
Reference: https://isc.sans.edu/forums/diary/Cryptojacking+Targeting+WebLogic+TCP7001/26768/
Reference: https://isc.sans.edu/forums/diary/Attackers+Exploiting+WebLogic+Servers+via+CVE202014882+to+install+Cobalt+Strike/26752/

PeoplSoft Infrastructure Products

The following Oracle Fusion Middleware products use Oracle WebLogic –

- **Oracle Business Intelligence (OBIEE)**
- **Oracle Coherence**
- **Oracle SOA Suite**
- **Oracle Identity Management**
  - Oracle Internet Directory
  - Oracle Access Manager
  - Oracle Unified Directory

WebLogic Vulnerabilities in the Future

- **21 security researchers credited with finding these bugs**
  - They will not stop at this bug
  - Actively working to find the next "hot" WebLogic vulnerability
  - Able to sell such vulnerabilities to services or monetize through bug bounties ($$$)

- **Integrigy anticipates that a number of high-risk WebLogic vulnerabilities will be found and patched in future Oracle Critical Patch Updates**
  - Security bugs most likely will be in core WebLogic components such as Console
  - Core components are in all WebLogic implementations including Oracle EBS, PeopleSoft, OBIEE, SOA, Identity Management, etc.

- **WebLogic must be proactively hardened and protected**
  - Block access to everything except what you absolutely need
  - Use native WebLogic security features
  - Use web application firewalls (WAF)
  - Use load balancer/reverse proxy

Integrigy AppDefend

AppDefend is an **enterprise application firewall** designed and optimized for the PeopleSoft.

- **Prevents Web Attacks**
  Detects and reacts to SQL Injection, XSS, and published PeopleSoft vulnerabilities
- **Protects Web Services**
  Detects and reacts to attacks against native web services (SOA, SOAP, REST)
- **Application Logging**
  Enhanced application logging for compliance requirements like SOX, GDPR, PCI-DSS 10.2
- **Two-factor Authentication (2FA)**
  Enables two-factor authentication for login, user, responsibility, or function

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