

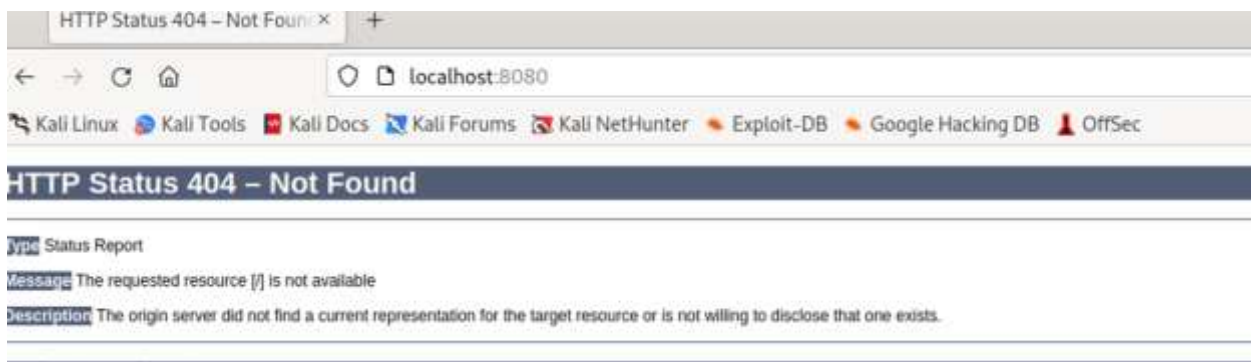
2.2C: Security configurations of Tomcat server

- In this category, I focused on configurations which act to guard the Tomcat server against two particular threats. In order to prevent access to the Tomcat managers page we need to change a couple of the default Tomcat parameters. Second, I ensured that they existed but were hard to detect with other tools such as NMap through which you can find out the type of the server and its version number. Because of the adjustments' exclusion of some threats that the server will inevitably face, security on the servers is also enhanced.
- First, I fixed the issue preventing access from the root path (<http://localhost:8080>) using the Tomcat manager page. It is important particularly because if they are hacked, the basic server pages include some extremely secure information. To do this, I made the following changes: Modifying the ROOT folder: I then navigated to the root > subfolder and then/into the web apps folder found in the Tomcat installation directory. Here, the default page is managed by index.jsp file, which was changed in this case. Using the file, I made it so that if anyone tried to visit the root URL, they would be shown the HTTP 404 page. This means that anybody who is not directly involved will automatically have less ways to know anything about them that should not lay their hands on.

```

234 <div id="low-help" class="">
235   <div class="curved container">
236     <div>Getting Help</div>
237     <div><a href="{tomcaturl}/faq/">FAQ</a> and <a href="{tomcaturl}/lists.html">Mailings lists</a></div>
238     <div>The following mailing lists are available:</div>
239     <ul>
240       <li id="list-announce"><strong><a href="{tomcaturl}/lists.html#tomcat-announce">tomcat-announce</a></li>
241       <li>Important announcements, releases, security vulnerability notifications. (low volume)</li>
242     </li>
243     <li><a href="{tomcaturl}/lists.html#tomcat-users">tomcat-users</a></li>
244     <li>User support and discussion</li>
245     </li>
246     <li><a href="{tomcaturl}/lists.html#taglibs-user">taglibs-user</a></li>
247     <li>User support and discussion for <a href="{tomcaturl}/taglibs/">Apache Taglibs</a></li>
248     </li>
249     <li><a href="{tomcaturl}/lists.html#tomcat-dev">tomcat-dev</a></li>
250     <li>Development mailing list, including commit messages</li>
251     </li>
252   </div>
253 </div>
254 </div>
255 <div class="separator" />
256 </div>
257 <div id="footer" class="curved container">
258   <div class="col28">
259     <div class="container">
260       <div><a href="{tomcaturl}/download-connectors.cgi">Tomcat Connectors</a></div>
261       <div><a href="{tomcaturl}/download-native.cgi">Tomcat Native</a></div>
262       <div><a href="{tomcaturl}/taglibs/">Taglibs</a></div>
263       <div><a href="{tomcaturl}/deployer-howto.html">Deployer</a></div>
264     </div>
265   </div>
266 </div>
267 </div>
268 <div class="col28">
269   <div class="container">
270     <div><a href="{tomcaturl}/other/Documentation/">Other Documentation</a></div>
271   </div>
272 </div>

```



- Custom Error Page: In order to have a better looking result, I created the custom 404 error page using the site's HTML prototyping recommendation. For this reason, this page informs the user that the requested web page is not available and the he should contact the administrator. Therefore, it was necessary to locate our custom page to the ROOT folder so it could launch when accessing the root URL.

```

1 <html>
2
3 <head>
4 <title>Page not found</title>
5 <link rel="icon" type="image/x-icon" href="favicon.ico">
6 </head>
7 <body>
8
9 <h1>
10 <center>The Page You looking for is not available, please connect with administrator.</center>
11 </h1>
12
13 </body>
14 </html>
15

```

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <!--
3 Licensed to the Apache Software Foundation (ASF) under one or more
4 contributor license agreements. See the NOTICE file distributed with
5 this work for additional information regarding copyright ownership.
6 The ASF licenses this file to You under the Apache License, Version 2.0
7 (the "License"); you may not use this file except in compliance with
8 the License. You may obtain a copy of the License at
9
10 http://www.apache.org/licenses/LICENSE-2.0
11
12 Unless required by applicable law or agreed to in writing, software
13 distributed under the License is distributed on an "AS IS" BASIS,
14 WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
15 See the License for the specific language governing permissions and
16 limitations under the License.
17 -->
18 <web-app xmlns="http://xmlns.jcp.org/xml/ns/javaee"
19 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
20 xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee
21 http://xmlns.jcp.org/xml/ns/javaee/web-app_4_0.xsd"
22 version="4.0"
23 metadata-complete="true">
24
25 <display-name>Welcome to Tomcat</display-name>
26 <description>
27 Welcome to Tomcat
28 </description>
29
30 <error-page>
31 <error-code>404</error-code>
32 <location>/404.html</location>
33 </error-page>

```


- Verifying the Modifications: About these changes I tested the server using the link <http://localhost:8080>. Sometimes this would take me to the website's 404 error page which stated that the management page could not be accessed through '. I then verified that the admin page was forwarded to <http://localhost:8080/manage-tomcat.jsp>, www.google.com/manage-tomcat.jsp and http of that same input.



Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/9.0.75

If you're seeing this, you've successfully installed Tomcat. Congratulations!



Recommended Reading:

- [Security Considerations How-To](#)
- [Manager Application How-To](#)
- [Clustering/Session Replication How-To](#)

Server Status
Manager App
Host Manager

Developer Quick Start

Tomcat Setup	Realms & AAA	Examples	Servlet Specifications
First Web Application	JDBC DataSources		Tomcat Versions

Managing Tomcat

For security, access to the [manager webapp](#) is restricted. Users are defined in:

```
$CATALINA_HOME/conf/tomcat-users.xml
```

In Tomcat 9.0 access to the manager application is split between different users. [Read more...](#)

[Release Notes](#)
[Changelog](#)

Documentation

[Tomcat 9.0 Documentation](#)
[Tomcat 9.0 Configuration](#)
[Tomcat Wiki](#)

Find additional important configuration information in:

```
$CATALINA_HOME/RUNNING.txt
```

Developers may be interested in:

[Tomcat 9.0 Bug Database](#)

Getting Help

[FAQ and Mailing Lists](#)

The following mailing lists are available:

- [tomcat-announce](#)
Important announcements, releases, security vulnerability notifications. (Low volume).
- [tomcat-users](#)
User support and discussion
- [taglibs-user](#)
User support and discussion for [Apache Taglibs](#)
- [tomcat-dev](#)

How to Stop Nmap from Detecting the Server

- I then encountered an issue, where Nmap scans revealed information about the version of Tomcat servers. Should all these features be exposed to public domain, the attackers looking for a specific chink in the armor will enjoy attacking the server. To put an end to this, I did the following:

```
(kali@kali)-[~]
└─$ sudo nmap -sV localhost
[sudo] password for kali:
Starting Nmap 7.92 ( https://nmap.org ) at 2024-09-28 15:28 EDT
Nmap scan report for localhost (127.0.0.1)
Host is up (0.0000010s latency).
Other addresses for localhost (not scanned): ::1
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh      OpenSSH 9.2p1 Debian 2 (protocol 2.0)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 0.75 seconds

(kali@kali)-[~]
└─$
```

- The file was identified as web.xml in the Tomcat7 server in the conf directory. This file keeps Tomcat's settings and alters its behavior in accordance with the received requests. This file also contained server details which I however ensured that they were not revealed to http responses such as the kind of server as well as version. This largely wards off tools such as Nmap to get the server information.

Preceding web.xml file

```
Warning: you are using the root account. You may harm your system.

server.xml  web.xml
20 xsl:schemaLocation= http://xmlns.jcp.org/xml/ns/javaee
21                      http://xmlns.jcp.org/xml/ns/javaee/web-app_4_0.xsd"
22 version="4.0">
23
24 <!-- Custom display name to hide Apache Tomcat information -->
25 <display-name>Apache Tomcat</display-name>
26
27 <!-- Custom error page to prevent information leakage -->
28 <error-page>
29   <error-code>404</error-code>
30   <location>/404.html</location>
31 </error-page>
32
33 <!-- Optional: Add init-param to hide server details -->
34 <init-param>
35   <param-name>server</param-name>
36   <param-value>Unknown</param-value>
37 </init-param>
38
```

Preceding Server.xml file

```
Warning: you are using the root account. You may harm your system.

server.xml  web.xml
21 →
22 <Server port="8005" shutdown="SHUTDOWN">
23   <Service name="Catalina">
24     <Connector port="8080" protocol="HTTP/1.1"
25       connectionTimeout="20000"
26       redirectPort="8443" />
27     <Engine name="Catalina" defaultHost="localhost">
28       <Host name="localhost" appBase="webapps"
29         unpackWARs="true" autoDeploy="true">
30         <Valve className="org.apache.catalina.valves.AccessLogValve"
31           directory="logs" prefix="localhost_access_log" suffix=".txt"
32           pattern="%h %l %u %t &quot;%r&quot; %s %b" />
33       </Host>
34     </Engine>
35   </Service>
36 </Server>
```


After-change file Web.xml

```
Warning: you are using the root account. You may harm your system.

server.xml  x  web.xml

<?xml version="1.0" encoding="UTF-8" ?>
<xsi:schemaLocation= http://xmlns.jcp.org/xml/ns/javaee
                      http://xmlns.jcp.org/xml/ns/javaee/web-app_4_0.xsd"
version="4.0">

<!-- Custom display name to hide Apache Tomcat information -->
<display-name>Unknown Server</display-name>

<!-- Custom error page to prevent information leakage -->
<error-page>
  <error-code>404</error-code>
  <location>/404.html</location>
</error-page>

<!-- Optional: Add init-param to hide server details -->
<init-param>
  <param-name>server</param-name>
  <param-value>Unknown</param-value>
</init-param>
```

After-change file Server.xml

```
Warning: you are using the root account. You may harm your system.

6  limitations under the license.
7  -->
8  <!-- Note: A "Server" is not itself a "Container", so you may not
9       define subcomponents such as "Valves" at this level.
10       Documentation at /docs/config/server.html
11  -->
12  <Server port="8005" shutdown="SHUTDOWN">
13    <Service name="Catalina">
14      <Connector port="8080" protocol="HTTP/1.1"
15                connectionTimeout="20000"
16                redirectPort="8443"
17                server="web-server" />
18      <Engine name="Catalina" defaultHost="localhost">
19        <Host name="localhost" appBase="webapps"
20              unpackWARs="true" autoDeploy="true">
21          <Valve className="org.apache.catalina.valves.AccessLogValve"
22                directory="logs" prefix="localhost_access_log" suffix=".txt"
23                pattern="%h %l %u %t &quot;%r&quot; %s %b" />
24        </Host>
25      </Engine>
26    </Service>
```

- Nmap testing: Before, the changes I made, I located and determined the version of the Tomcat server using Nmap. As such, after making those changes I repeated the scan to carry out the next steps. This time around there was no detail in the server information that would suggest that it had changed to show that the information has been well hidden as required.

```

[ball@kali]~$ nmap -v localhost
Starting Nmap 7.92 ( https://nmap.org ) at 2024-09-26 15:28 EDT
Nmap scan report for localhost (127.0.0.1)
Host is up (0.0000000s latency).
Other addresses for localhost (not scanned): ::1
Not shown: 998 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
22/tcp    open  ssh          OpenSSH 9.8p1 Debian 0 (protocol 2.0)
8080/tcp   open  http-proxy   web-server
1 service unrecognized despite returning data. If you know the service/version, please submit the following fingerprint at https://nmap.org/cgi-bin/submit.cgi?new-ser
SF: 8080/tcp <tcp>: 2, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 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