Chaos Engineering Report

14 July 2022

Contents

ımmary	:
Contributions	:
Areas Contributions Breakdown	
periment	
My flask app experiment	
Summary	
Definition	
Result	
Appendix	!

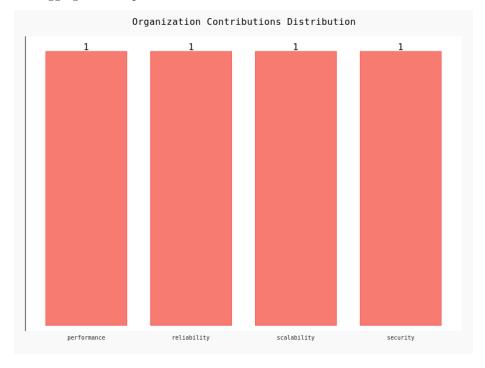
Summary

This report aggregates 1 experiments spanning over the following subjects: $flask,\ python$

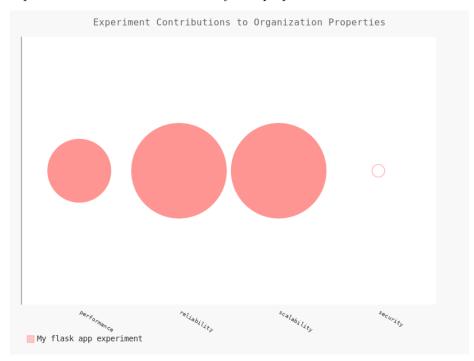
Contributions

Contributions surface the properties this collection of experiments target in order to improve the confidence and trust in the system.

The aggregated 1 experiments cover 4 distinct contributions:



Experiment Contributions Breakdown The breakdown of impacts each experiment contributes to for these system properties¹:

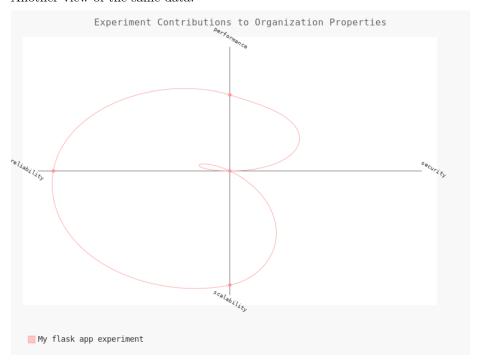


Sparse lines indicate a given experiment focused on a specific subset of contributions.

Sparse columns indicate that a given contribution was seldom impacted by this collection of experiments.

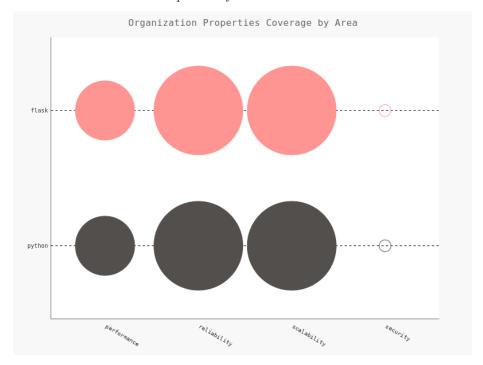
 $^{^1\}mathrm{Empty}$ dots indicate an experiment is explicitely not addressing a given contribution while missing dots indicate no data for a given contribution.

Another view of the same data:



Areas Contributions Breakdown

The distribution of areas impacted by these contributions²:



Sparse lines indicate a given tag contributes only to a specific subset of system property.

Sparse columns indicate that a given contribution impacts moderately areas covered by the experiments.

 $^{^2}$ Empty dots indicate a tag is explicitely not addressing a given contribution while missing dots indicate no data for a given contribution.

Experiment

My flask app experiment

sample demo to determine resiliency in existing flask web app

Summary

Status	completed
Tagged	python, flask
Executed From	ip-172-31-40-90
Platform	$Linux-5.13.0-1029-aws-x86_64-with-glibc2.29$
Started	Thu, 14 Jul 2022 10:09:22 GMT
Completed	Thu, 14 Jul 2022 10:09:22 GMT
Duration	0 seconds

Definition

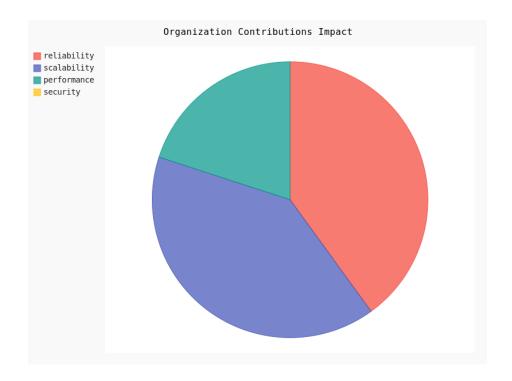
The experiment was made of 0 actions, to vary conditions in your system, and 2 probes, to collect objective data from your system during the experiment.

Organization Contributions

An estimate of relative system properties this experiment contributes to:

Contribution	Impact
reliability	high
scalability	high
performance	medium
security	none

The "none" value for an impact indicates that this experiment explicitely does not address that specific property.



Steady State Hypothesis

The steady state hypothesis this experiment tried was "Website is OK".

Before Run

The steady state was verified

Probe	Tolerance	Verified
website must be up and running	200	True

After Run

The steady state was verified

Probe	Tolerance	Verified
website must be up and running	200	True

Method

The experiment method defines the sequence of activities that help gathering

evidence towards, or against, the hypothesis.

The following activities were conducted as part of the experimental's method:

Type	Name
probe	website must return 500
probe	website must return 200 with json response

Result

The experiment was conducted on Thu, 14 Jul 2022 10:09:22 GMT and lasted roughly 0 seconds.

Probe - website must return 500

Status	succeeded
Background	False
Started	Thu, 14 Jul 2022 10:09:22 GMT
Ended	Thu, 14 Jul 2022 10:09:22 GMT
Duration	0 seconds

The probe provider that was executed:

\mathbf{Type}	http
\mathbf{URL}	http://localhost:5002/return-failure
Method	GET
Timeout	[3, 5]
Arguments	N/A

Probe - website must return 200 with json response

Status	succeeded
Background	False
Started	Thu, 14 Jul 2022 10:09:22 GMT
Ended	Thu, 14 Jul 2022 10:09:22 GMT
Duration	0 seconds

The probe provider that was executed:

Type	http
\mathbf{URL}	http://localhost:5002/json-example
Method	GET

Timeout	[3, 5]
Arguments	N/A

Appendix

Probe - website must return 500

The *probe* returned the following result:

```
{'body': '<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"\n'
         ' "http://www.w3.org/TR/html4/loose.dtd">\n'
         '<html>\n'
         ' <head>\n'
             <title>json.decoder.JSONDecodeError: Expecting property name '
         'enclosed in double quotes: line 1 column 2 (char 1) // Werkzeug '
         'Debugger</title>\n'
              <link rel="stylesheet" '</pre>
         'href="?__debugger__=yes&cmd=resource&f=style.css"\n'
                 type="text/css">\n'
              <!-- We need to make sure this has a favicon so that the '
         'debugger does\n'
                  not accidentally trigger a request to /favicon.ico which '
         'might\n'
                  change the application's state. -->\n"
              <link rel="shortcut icon"\n'</pre>
         'href="?__debugger__=yes&cmd=resource&f=console.png">\n'
              <script '
         'src="?__debugger__=yes&cmd=resource&f=debugger.js"></script>\n'
             <script type="text/javascript">\n'
               var TRACEBACK = 140352018412544,\n'
                   CONSOLE MODE = false, \n'
                   EVALEX = true, \n'
                   EVALEX_TRUSTED = false,\n'
                    SECRET = "u9Ix64QzWbIx9m60Fd4G";\n'
             </script>\n'
           </head>\n'
           <body style="background-color: #fff">\n'
              <div class="debugger">\n'
         '<h1>json.decoder.JSONDecodeError</h1>\n'
         '<div class="detail">\n'
         ' class="errormsg">json.decoder.JSONDecodeError: Expecting '
         'property name enclosed in double quotes: line 1 column 2 (char '
         '1)\n'
         '</div>\n'
         '<h2 class="traceback">Traceback <em>(most recent call '
```

```
'last)</em></h2>\n'
'<div class="traceback">\n'
' <h3></h3>\n'
' <div class="frame" id="frame-140352018413888">\n'
 <h4>File <cite '
'class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py"<
     line <em class="line">2091</em>,\n'
     in <code class="function">__call__</code></h4>\n'
 <div class="source "><span class="ws">
'</span>def __call__(self, environ: dict, start_response: t.Callable) '
'-> t.Any:\n'
'<span class="ws">
'</span>&quot;&quot; &quot; The WSGI server calls the Flask application '
'object as the\n'
'<span class="ws">
                                       </span>WSGI '
'application. This calls :meth:`wsgi_app`, which can be\n'
'<span class="ws">
                                      </span>wrapped to '
'apply middleware.\n'
'<span class="ws">
'</span>&quot;&quot;\n'
                                       </span>return '
'<span class="ws">
'self.wsgi_app(environ, start_response)</div>\n'
'</div>\n'
'\n'
'<div class="frame" id="frame-140352018413936">\n'
' <h4>File <cite '
'class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py"<
     line <em class="line">2076</em>,\n'
     in <code class="function">wsgi_app</code></h4>\n'
' <div class="source "><span '
'class="ws">
                 </span>try:\n'
'<span class="ws">
'</span>ctx.push()\n'
'<span class="ws">
'</span>response = self.full_dispatch_request()\n'
'<span class="ws">
                                          </span>except '
'Exception as e:\n'
'<span class="ws">
'</span>error = e\n'
'<span class="ws">
'</span>response = self.handle_exception(e)\n'
'<span class="ws">
                                         </span>except: '
'# noqa: B001\n'
'<span class="ws">
'</span>error = sys.exc_info()[1]\n'
'<span class="ws">
```

```
'</span>raise\n'
'<span class="ws">
                                      </span>return '
'response(environ, start_response)\n'
'<span class="ws">
'</span>finally:</div>\n'
'</div>\n'
'\n'
'<div class="frame" id="frame-140352018414080">\n'
' <h4>File <cite '
'class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py"<
    line <em class="line">2073</em>,\n'
    in <code class="function">wsgi_app</code></h4>\n'
' <div class="source "><span '
'<span class="ws">
                                   </span>error: '
't.Optional[BaseException] = None\n'
'<span class="ws">
                                    </span>try:\n'
'<span class="ws">
'</span>try:\n'
'<span class="ws">
'</span>ctx.push()\n'
'<span class="ws">
'</span>response = self.full_dispatch_request()\n'
'<span class="ws">
                                      </span>except '
'Exception as e:\n'
'<span class="ws">
'</span>error = e\n'
'<span class="ws">
'</span>response = self.handle_exception(e)\n'
'<span class="ws">
                                    </span>except: '
'# noqa: B001\n'
'<span class="ws">
'</span>error = sys.exc_info()[1]</div>\n'
'</div>\n'
'\n'
'<div class="frame" id="frame-140352018414272">\n'
' <h4>File <cite '
'class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py"<
    line <em class="line">1519</em>,\n'
    in <code class="function">full_dispatch_request</code></h4>\n'
' <div class="source "><span '
'class="ws">
                </span>rv = self.preprocess_request()\n'
'<span class="ws">
                                      </span>if rv '
'is None:\n'
'<span class="ws">
                                          </span>rv '
```

'= self.dispatch_request()\n'

```
'<span class="ws">
                                </span>except '
'Exception as e:\n'
'<span class="ws">
                                      </span>rv = '
'self.handle_user_exception(e)\n'
'<span class="ws">
                                   </span>return '
'self.finalize_request(rv)\n'
'<span class="ws"></span> \n'
'finalize_request(\n'
                                  </span>self,\n'
'<span class="ws">
'<span class="ws">
                                  </span>rv: '
't.Union[ResponseReturnValue, HTTPException],
'<span class="ws">
'</span>from error handler: bool = False,</div>\n'
'</div>\n'
' \n'
'<div class="frame" id="frame-140352018414320">\n'
' <h4>File <cite '
class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py"<
    line <em class="line">1540</em>,\n'
    in <code class="function">finalize_request</code></h4>\n'
' <div class="source "><span '
'class="ws"></span> \n'
'<span class="ws">
'</span>:internal:\n'
'<span class="ws">
'</span>&quot;&quot;\n'
'<span class="ws">
                                  </span>response = '
'self.make_response(rv)\n'
'<span class="ws">
                                   </span>try:\n'
'<span class="ws">
'</span>response = self.process_response(response)\n'
'<span class="ws">
'</span>request_finished.send(self, response=response)\n'
'<span class="ws">
                                 </span>except '
'Exception:\n'
'<span class="ws">
                                    </span>if not '
'from_error_handler:
'<span class="ws">
'</span>raise\n'
'<span class="ws">
'</span>self.logger.exception(</div>\n'
'</div>\n'
'\n'
'''<div class="frame" id="frame-140352018414368">\n'
' <h4>File <cite '
```

```
'class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py"<
    line <em class="line">1885</em>,\n'
    in <code class="function">process response</code></h4>\n'
' <div class="source "><span '
'class="ws">
                </span>response = '
'self.ensure_sync(func)(response)\n'
'<span class="ws"></span> \n'
'<span class="ws">
                                  </span>for name in '
'chain(request.blueprints, (None,)):\n'
'<span class="ws">
                                       </span>if name '
'in self.after_request_funcs:\n'
'<span class="ws">
                                         </span>for '
'func in reversed(self.after_request_funcs[name]):
'<span class="ws">
'</span>response = self.ensure_sync(func)(response)\n'
'<span class="ws"></span> \n'
'<span class="ws">
                                   </span>if not '
'self.session_interface.is_null_session(ctx.session):\n'
'<span class="ws">
'</span>self.session_interface.save_session(self, ctx.session, '
'response)\n'
'<span class="ws"></span> \n'
'response</div>\n'
'</div>\n'
'\n'
'<div class="frame" id="frame-140352018414416">\n'
' <h4>File <cite '
'class="filename">"/home/ubuntu/chaostk/lib/python3.8/site-packages/pdchaos/middler
    line <em class="line">14</em>,\n'
    in <code class="function">_after_request</code></h4>\n'
' <div class="source "><span '
'class="ws"></span> \n'
'<span class="ws"></span>def '
'_after_request(response):\n'
'<span class="ws">
'</span>&quot;&quot;&quot;Runs after each request.\n'
'https://flask.palletsprojects.com/en/1.1.x/api/#flask.Flask.after_request
'<span class="ws">
'</span>&quot;&quot;&quot;\n'
'json.loads(request.headers.get(HEADER_ATTACK)) if (HEADER_ATTACK in '
'request.headers) else None\n'
'<span class="ws">
                                </span>attack ctx = '
'{ATTACK_KEY_ROUTE: request.path}\n'
```

```
'<span class="ws"></span> \n'
'<span class="ws">
'</span>chaos.attack(attack, attack ctx)\n'
'response\n'
'<span class="ws"></span> </div>\n'
'</div>\n'
'\n'
'<div class="frame" id="frame-140352018414128">\n'
' <h4>File <cite '
'class="filename">"/usr/lib/python3.8/json/__init__.py"</cite>,\n'
    line <em class="line">357</em>,\n'
     in <code class="function">loads</code></h4>\n'
' <div class="source "><span '
'class="ws">
              </span>del kw[&#x27;encoding&#x27;]\n'
'<span class="ws"></span> \n'
'<span class="ws">
                                  </span>if (cls is None '
'and object_hook is None and\n'
'<span class="ws">
'</span>parse_int is None and parse_float is None and\n'
'<span class="ws">
'</span>parse_constant is None and object_pairs_hook is None and not '
'kw):\n'
'<span class="ws">
                                      </span>return '
'_default_decoder.decode(s)\n'
'<span class="ws">
                                  </span>if cls is '
'None:\n'
'<span class="ws">
                                     </span>cls = '
'JSONDecoder\n'
'<span class="ws">
                                 </span>if object_hook '
'is not None:\n'
'<span class="ws">
'</span>kw[&#x27;object hook&#x27;] = object hook\n'
'<span class="ws">
                                </span>if '
'object_pairs_hook is not None:</div>\n'
'</div>\n'
'\n'
'''<div class="frame" id="frame-140352018413984">\n'
' <h4>File <cite '
'class="filename">"/usr/lib/python3.8/json/decoder.py"</cite>,\n'
    line <em class="line">337</em>,\n'
     in <code class="function">decode</code></h4>\n'
' <div class="source "><span class="ws">
'</span>def decode(self, s, _w=WHITESPACE.match):\n'
'<span class="ws">
'</span>&quot;&quot;&quot;Return the Python representation of ``s`` '
```

```
'(a ``str`` instance\n'
'<span class="ws">
                                   </span>containing '
'a JSON document).\n'
'<span class="ws"></span> \n'
'<span class="ws">
'</span>&quot;&quot;\n'
'<span class="ws">
                                     </span>obj, end = '
'self.raw_decode(s, idx=_w(s, 0).end())\n'
'<span class="ws">
                                   </span>end = w(s, '
'end).end()\n'
'<span class="ws">
                                   </span>if end != '
'len(s):\n'
'<span class="ws">
                                      </span>raise '
'JSONDecodeError("Extra data", s, end)\n'
'<span class="ws">
                                   </span>return '
'obj\n'
'<span class="ws"></span> </div>\n'
'</div>\n'
'\n'
'<div class="frame" id="frame-140352018414512">\n'
' <h4>File <cite '
'class="filename">"/usr/lib/python3.8/json/decoder.py"</cite>,\n'
    line <em class="line">353</em>,\n'
    in <code class="function">raw_decode</code></h4>\n'
' <div class="source "><span '
'class="ws">
             </span>This can be used to decode a JSON document '
'from a string that may\n'
'<span class="ws">
                                    </span>have '
'extraneous data at the end.\n'
'<span class="ws"></span> \n'
'<span class="ws">
'</span>&quot;&quot;\n'
'<span class="ws">
                                   </span>try:\n'
'<span class="ws">
                                       </span>obj, '
'end = self.scan_once(s, idx)\n'
'<span class="ws">
                                   </span>except '
'StopIteration as err:\n'
'<span class="ws">
                                      </span>raise '
'JSONDecodeError(" Expecting value", s, err.value) from '
'None\n'
'<span class="ws">
                                 </span>return obj, '
'end</div>\n'
'</div>\n'
'\n'
' <blockquote>json.decoder.JSONDecodeError: Expecting property name '
'enclosed in double quotes: line 1 column 2 (char 1)</blockquote>\n'
```

```
'</div>\n'
'\n'
'<div class="plain">\n'
    \n'
      This is the Copy/Paste friendly version of the traceback.\n'
    \n'
    <textarea cols="50" rows="10" name="code" readonly>Traceback '
'(most recent call last):\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 2091, in __call__\n'
    return self.wsgi_app(environ, start_response)\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 2076, in wsgi_app\n'
    response = self.handle exception(e)\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 2073, in wsgi_app\n'
    response = self.full_dispatch_request()\n'
' File
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 1519, in full_dispatch_request\n'
    return self.finalize_request(rv)\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 1540, in finalize request\n'
    response = self.process response(response)\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 1885, in process_response\n'
    response = self.ensure sync(func)(response)\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/pdchaos/middleware/contrib,
'line 14, in _after_request\n'
    attack = json.loads(request.headers.get(HEADER_ATTACK)) if '
'(HEADER_ATTACK in request.headers) else None\n'
' File "/usr/lib/python3.8/json/__init__.py", line 357, in '
    return _default_decoder.decode(s)\n'
' File "/usr/lib/python3.8/json/decoder.py", line 337, in '
'decode\n'
    obj, end = self.raw_decode(s, idx=_w(s, 0).end())\n'
' File "/usr/lib/python3.8/json/decoder.py", line 353, in '
'raw decode\n'
    obj, end = self.scan_once(s, idx)\n'
```

```
'json.decoder.JSONDecodeError: Expecting property name enclosed in '
'double quotes: line 1 column 2 (char 1)</textarea>\n'
'</div>\n'
'<div class="explanation">\n'
' The debugger caught an exception in your WSGI application. You '
'can now\n'
' look at the traceback which led to the error. <span '
'class="nojavascript">\n'
' If you enable JavaScript you can also use additional features such '
'as code\n'
' execution (if the evalex feature is enabled), automatic pasting of '
'the\n'
' exceptions and much more.
'</div>\n'
      <div class="footer">\n'
        Brought to you by <strong class="arthur">DON\'T'
'PANIC</strong>, your\n'
        friendly Werkzeug powered traceback interpreter.\n'
      </div>\n'
    </div>\n'
'\n'
    <div class="pin-prompt">\n'
      <div class="inner">\n'
        <h3>Console Locked</h3>\n'
         \n'
          The console is locked and needs to be unlocked by entering '
'the PIN.\n'
          You can find the PIN printed out on the standard output of '
'your\n'
          shell that runs the server.\n'
        <form>\n'
           PIN:\n'
             <input type=text name=pin size=14>\n'
             <input type=submit name=btn value="Confirm Pin">\n'
         </form>\n'
      </div>\n'
    </div>\n'
  </body>\n'
'</html>\n'
'\n'
'<!--\n'
'\n'
'Traceback (most recent call last):\n'
' File '
'"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
'line 2091, in _{call}_{n'}
```

```
return self.wsgi_app(environ, start_response)\n'
        ' File '
        "home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
        'line 2076, in wsgi_app\n'
            response = self.handle_exception(e)\n'
        ' File
        '"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
        'line 2073, in wsgi_app\n'
            response = self.full dispatch request()\n'
        ' File '
        '"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
        'line 1519, in full_dispatch_request\n'
            return self.finalize request(rv)\n'
        ' File '
        '"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
        'line 1540, in finalize request\n'
             response = self.process_response(response)\n'
        ' File '
        '"/home/ubuntu/chaostk/lib/python3.8/site-packages/flask/app.py", '
        'line 1885, in process_response\n'
           response = self.ensure_sync(func)(response)\n'
        ' File '
        "/home/ubuntu/chaostk/lib/python3.8/site-packages/pdchaos/middleware/contrib/flasl
        'line 14, in _after_request\n'
            attack = json.loads(request.headers.get(HEADER_ATTACK)) if '
        '(HEADER ATTACK in request.headers) else None\n'
          File "/usr/lib/python3.8/json/__init__.py", line 357, in loads\n'
            return default decoder.decode(s)\n'
        ' File "/usr/lib/python3.8/json/decoder.py", line 337, in decode\n'
             obj, end = self.raw_decode(s, idx=_w(s, 0).end())\n'
        ' File "/usr/lib/python3.8/json/decoder.py", line 353, in '
        'raw decode\n'
            obj, end = self.scan once(s, idx)\n'
        'json.decoder.JSONDecodeError: Expecting property name enclosed in '
        'double quotes: line 1 column 2 (char 1)\n'
        '\n'
        '-->\n',
'headers': {'Connection': 'close',
            'Content-Type': 'text/html; charset=utf-8',
            'Date': 'Thu, 14 Jul 2022 10:09:22 GMT',
            'Server': 'Werkzeug/2.0.2 Python/3.8.10',
            'X-XSS-Protection': '0'},
'status': 500}
```

Probe - website must return 200 with json response

The probe returned the following result: