# **Web Applications Tested:**

I chose to test the following web applications. For each of the 3 mentioned here, I made sure to record the script using the HTTPS Test Script Recorder. Upon visiting said websites, I tried to simulate a real user by interacting with the webpage as well. This resulted in highly accurate and realistic user behavior.

1. <https://www.mit.edu/>
2. <https://www.mit.edu/research>
3. <http://news.mit.edu/>

# **Duration Assertions:**

We were tasked to set such a duration assertion that results in both successful and failed events. For achieving this goal, I first ran the test plan without any duration assertion and obtained the results. From the ***Aggregate Report*** in my test plan, I could find the Median Sample Time for each of the 6 Recording controllers. The web applications showed a median sample times very close to the duration assertion limits set here. This ensured about half of the requests were successful while the rest were not due to the Duration Assertion. The finals results attached here are with the said Duration Assertions.

|  |  |
| --- | --- |
| ****Web applications**** | ****Limit set for Duration Assertion (in milliseconds)**** |
| <https://www.mit.edu/> | 400 |
| <https://www.mit.edu/research> | 1500 |
| <http://news.mit.edu/> | 4800 |

# **Comparison of Execution Time:**

The execution times have been listed here as obtained from the tests. Some of the requests(like fetching videos) from the webpage failed at times resulting in an extremely high Execution time and thus bringing the average execution time up. But the median execution times can give us a better representation of what the requests’ execution times looked like in general.

## Explanation for the longest execution times:

Sending too many requests from the same IP address caused the website to stop accepting certain resource heavy requests (like the video fetching requests). This can be seen from the following error obtained in the report: “Non HTTP response code: javax.net.ssl.SSLHandshakeException/Non HTTP response message: **Remote host terminated the handshake**”. This is a **rate-limiting or anti-DDoS measure** taken by the websites to prevent abuse.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Web Applications | Number of Threads (Users) | Shortest Execution Time (in milliseconds) | Longest Execution Time (in milliseconds) | Average Execution Time (in milliseconds) | Median Execution Time (in milliseconds) |
| <https://www.mit.edu/> | 50 | 42 | 3142042 | 39591 | 371 |
| 100 | 42 | 3144320 | 37644 | 361 |
| <https://www.mit.edu/research> | 50 | 49 | 3127056 | 46587 | 1228 |
| 100 | 43 | 3143814 | 50698 | 1214 |
| <http://news.mit.edu/> | 50 | 80 | 166963 | 6412 | 4427 |
| 100 | 54 | 104343 | 6447 | 4636 |

# **Comparison of Average Throughput, Data Transmission and Reception:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Web Applications | Number of Threads (Users) | Average Throughput(/min) | Average Data Transmission (KB/sec) | Average Data Reception (KB/sec) |
| <https://www.mit.edu/> | 50 | 22.1 | 0.21 | 6.93 |
| 100 | 44.4 | 0.42 | 14.10 |
| <https://www.mit.edu/research> | 50 | 16.4 | 0.17 | 91.81 |
| 100 | 32.3 | 0.34 | 175.71 |
| <http://news.mit.edu/> | 50 | 90 | 1.00 | 151.84 |
| 100 | 162 | 1.79 | 270.87 |

# **Conclusion and Observations:**

**1. Performance of Web Applications Under Load**

* [**https://www.mit.edu/**](https://www.mit.edu/):
  + This application had the **shortest median execution time** of the three, indicating it handles requests efficiently.
  + However, its **longest execution time** reached extreme values (e.g., 3,144,320 ms), due to resource-heavy or failed requests, such as video loads.
* [**https://www.mit.edu/research/**](https://www.mit.edu/research/):
  + This application showed **moderate performance**, with median execution times significantly higher than the main MIT website.
  + The **duration assertion limit of 1500 ms** suggests this site is expected to take longer for user interactions due to more complex content or features.
* [**http://news.mit.edu/**](http://news.mit.edu/):
  + This site had the **highest median execution time** across tests, indicating it is the slowest among the three applications, possibly due to resource-heavy elements like media or dynamic content.
  + The **duration assertion limit of 4800 ms** reflects its longer processing times.

**2. Throughput and Data Usage**

* [**https://www.mit.edu/**](https://www.mit.edu/):
  + Throughput increases proportionally with the number of users (22.1 to 44.4 requests/min), but **data reception** (6.93 KB/sec to 14.10 KB/sec) is low compared to other applications.
  + This suggests minimal content per request, likely a lightweight or static design.
* [**https://www.mit.edu/research/**](https://www.mit.edu/research/):
  + Throughput is lower compared to the main MIT website (16.4 to 32.3 requests/min), but **data reception** is significantly higher (91.81 KB/sec to 175.71 KB/sec), suggesting it serves larger data-heavy content.
* [**http://news.mit.edu/**](http://news.mit.edu/):
  + With the highest throughput (90 to 162 requests/min) and **data reception rates (151.84 KB/sec to 270.87 KB/sec)**, this site processes the most content, likely due to frequent updates or media-rich content.

**3. Impact of User Load (Threads)**

* Across all applications, increasing the number of threads (users) from 50 to 100:
  + Increased throughput linearly, reflecting good scalability.
  + Increased average and median execution times slightly but remained manageable within the duration assertion limits, except for some long-running requests.