Multi-Threaded Web Server with IPC and Semaphores

SUBMISSION COVER SHEET

STUDENTS INFORMATION

Name: Bernardo Mota Coelho

Student ID: 125059

Email: bernardomcoelho@ua.pt

Course: Informatics Engineering

Section: P3

Instructor: Pedro Azevedo Fernandes

Submission Date: 12-12-2025

Name: Tiago Francisco Crespo do Vale

Student ID: 125913

Email: tiagofcvale@ua.pt

Course: Informatics Engineering

Section: P3

Instructor: Pedro Azevedo Fernandes

Submission Date: 12-12-2025

PROJECT INFORMATION

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Project Title: Multi-Threaded Web Server with IPC and
Semaphores

Version: First

Total Files: 58

Archive Size: 38.4 MB

IMPLEMENTATION STATUS

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Core Features:

 ☑   Multi-process architecture (master + worker processes)

 ☑   Thread pool in each worker for concurrent request
handling

 ☑   HTTP/1.1 support: GET and HEAD methods

 ☑   Static file server (HTML, CSS, JS, images)

 ☑   Custom error pages (404, 403, 500, 503, etc.)

 ☑   Inter-process communication via POSIX shared memory

 ☑   Synchronization using POSIX semaphores

 ☑   Thread-safe logging for all requests and errors

 ☑   Statistics: requests served, bytes transferred,
response times

 ☑   Thread-safe LRU cache for frequently accessed files

☑   Graceful shutdown with IPC resource cleanup

☑   Configuration via server.conf (port, etc.)

Optional Features Implemented:

☑   Real-time Web Dashboard

☑   HTTP Keep-Alive

☑   HTTPS/SSL Support

☑   HTML for each code error

☑   Other: All server informations in terminal

TESTING STATUS

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Total Test Cases: 33

Tests Passed: 33

Tests Failed: 0

Pass Rate: 100%

KNOWN ISSUES

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List any known bugs or limitations:

1.
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2.
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3.

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COLLABORATION DECLARATION

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I declare that this work is my own and has been completed in accordance with the academic integrity policy. I have properly cited all sources and assistance received.

Resources Used (list websites, books, tools):

1.   W3 Schools - https://www.w3schools.com/

2.   Stack Overflow - https://stackoverflow.com/questions

3.   Modern Operating Systems 4th Edition - Tanenbaum & Bos
   - https://csc-knu.github.io/sys-prog/books/Andrew%20S.%2
     0Tanenbaum%20-%20Modern%20Operating%20Systems.pdf

4.   VS Code

5.   Github

6.   Linux Terminal (Ubuntu)

7.   Article about https server - docs.nodejitsu.com - https://web.archive.org/web/20190114150423/https://docs.no dejitsu.com/articles/HTTP/servers/how-to-create-a-HTTPS-se rver/

AI Assistance (describe what was assisted, if any):

   - Used to explain certain concepts;

STUDENT SIGNATURES

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Signature: _Bernardo Mota Coelho_ Date: 12-12-2025

Signature: _____Tiago Vale_____ Date: 12-12-2025

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