

ConcurrentHTTP Server - User Manual

Sistemas Operativos 2025/2026 - Trabalho Prático 2

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1. System Requirements

Required Software:

- **Operating System:** Linux (Ubuntu 20.04 or later or other distributions)
- **Compiler:** GCC 9.0+ with C11 support
- **Libraries:** pthread, rt (POSIX real-time)

Installation:

```
# Ubuntu/Debian
sudo apt-get update
sudo apt-get install -y build-essential gcc make

# Verify installation
gcc --version
make --version
```

2. Compilation

Using Makefile:

```
# Build the server
make

# Clean build artifacts
make clean

# Rebuild from scratch
make clean && make
```

Manual Compilation:

```
gcc -Wall -Wextra -pthread -lrt -o server \
    src/main.c src/master.c src/worker.c src/http.c \
    src/thread_pool.c src/cache.c src/logger.c \
    src/stats.c src/config.c
```

Compiler flags:

- **-pthread:** Thread support
- **-lrt:** POSIX semaphores and shared memory

3. Configuration

Configuration File (server.conf):

```
PORT=8080
DOCUMENT_ROOT=./www
NUM_WORKERS=4
THREADS_PER_WORKER=10
MAX_QUEUE_SIZE=100
LOG_FILE=access.log
CACHE_SIZE_MB=10
TIMEOUT_SECONDS=30
```

Key Parameters

Parameter	Default	Description
PORT	8080	TCP port for HTTP server
DOCUMENT_ROOT	./www	Root directory for serving files
NUM_WORKERS	4	Number of worker processes
THREADS_PER_WORKER	10	Thread pool size per worker
MAX_QUEUE_SIZE	100	Connection queue capacity
CACHE_SIZE_MB	10	Maximum cache size per worker (MB)
LOG_FILE	access.log	Path to access log file

TIMEOUT_SECONDS	30	Connection timeout in seconds
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4. Execution

Starting the Server:

```
# Compile the code
make

# Start the Server
./server
```

Expected Output:

```
--- Configuration Loaded ---
Port: 8080
Workers: 4
Threads per Worker: 10
-----
[MASTER] Logger initialized: access.log
[IPC] Initializing shared memory and semaphores...
(...)
```

Accessing The Server:

```
# Web browser
firefox http://localhost:8080

# Command line
curl http://localhost:8080/index.html
```

Stopping The Server:

```
# From server terminal
Press Ctrl+C
```

```
# Or send signal
kill $(pgrep -f "./server")
```

5. Monitoring

Server Statistics:

Statistics display automatically every 30 seconds

```
=====
SERVER STATISTICS
=====
Uptime: 120 seconds
Total Requests: 1542
Successful (200): 1425
Not Found (404): 107
Bytes Transferred: 15728640
Active Connections: 12
=====
```

Access Logs:

Logs are saved automatically and displayed in the access.log document

Log Format:

```
127.0.0.1 - - [10/Dec/2025:13:55:36 +0000] "GET /index.html HTTP/1.1" 200
2048
```