Design Document
Q1 - Server Performance

BY

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PROBLEM STATEMENT:

You are required to implement and compare the performances of the following server designs on a cloud.

1. **Multi-Process**
2. **Multi-Threaded**
3. **Single Process Event-Driven**
4. **Asynchronous Multi-Process Event Driven**
A. Implement each of the above server designs for serving static files using HTTP/1.1 protocol.
B. Run each of the servers on Azure cloud.
C. Generate HTTP traffic for each of the webserver using httpperf tool, requesting a file of size at least 10 MB.
D. Plot the following graphs for each of them (X-axis will have server types).
   a. connection rate
   b. connection time
   c. reply rate
   d. reply time
   e. throughput
   f. Server side request processing time

System Description

Block Diagram:

```
┌──────────────┐      ┌──────────────────┐      ┌──────────────────────┐
│              │      │ Connection       │      │ Select call is used  │
│ TCP socket   │─────▶│ accepted         │─────▶│ to check             │
│ setup        │      │ by parent        │      │ for I/O operations   │
│              │      │                  │      │ that have            │
└──────────────┘      └──────────────────┘      │ completed.           │
                              │                  └──────────────────────┘
                              ▼                             │
                      ┌──────────────────┐                 ▼
                      │ Update process   │      ┌──────────────────────┐
                      │ pool             │      │ Parent creates new   │
                      └──────────────────┘      │ thread (in case of   │
                                                │ Multi-thread) or new │
   ┌──────────────┐   ┌──────────────────┐      │ process (in case of  │
   │ Parse        │◀──│ Process Request  │◀─────│ Multi-process) for   │
   │ Request      │   │                  │      │ the connection       │
   └──────────────┘   └──────────────────┘      └──────────────────────┘
         │
         ▼
   ┌──────────────┐        ◇                    ┌──────────────────────┐
   │ Check file   │─────▶ Found  ──── No ─────▶ │ Error 404 Not Found  │
   └──────────────┘        ◇                    └──────────────────────┘
                           │
                          yes
                           ▼
                    ┌──────────────┐
                    │ Content type │
                    │ check        │
                    └──────────────┘
                           │
                           ▼
┌──────────────┐   ┌──────────────┐   ┌──────────────────────────┐
│ Update log   │◀──│ Response     │──▶│ Send response statistics │
│ file         │   │              │   │ to the message queue     │
└──────────────┘   └──────────────┘   └──────────────────────────┘
```