LAYER 0: HOST SYSTEM (PC – Python/PyTorch)
(Kernel Compilation, Grid Tiling, Data Flattening to Linear Stream)

USB Serial / WiFi (Command Stream)

LAYER 1: GPU MASTER & TENSOR ENGINE [AMB82-Mini]
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[Main Thread / CPU]
1. Parse USB CMD Packets
2. Manage VRAM Pointers
3. Trigger DMA Transfers

[Hardware Engine / DMA]
1. Drive 8080 Parallel Bus
2. VRAM → GPIO (Zero-Copy)
3. Gen. WR/CS Timing Signals

Control (CMD)　　Data Stream (Weights)

GLOBAL G-BUS (8-bit Parallel)
~50MB/s Memory Streaming
[D0-D7 | WR | RD | DC | CS x]

LAYER 2: SM 0 [ESP32-S3]

CORE 0 (Receiver)
[Upstream IO]
1. Listen to GlobalBus
2. Drive Slave Interface (RX)
3. Write to L1 PSRAM

(RingBuf)

CORE 1 (Scheduler)
[Downstream IO]
1. Read L1 PSRAM
2. Warp Scheduler Logic
3. Drive Local Master (TX)

LAYER 2: SM 1
(Collapsed View)

LAYER 2: SM N
(Collapsed View)

LOCAL G-BUS (8-bit Parallel)
~40MB/s Instruction Broadcast
[D0-D7 | WR | RD | DC | CS[0..3]]

SMSP 0 [RP2040]

CORE 0 (IO)
1. PIO RX Manager
2. Fill FIFO
3. Sync Signals

[FIFO]

CORE 1 (ALU)
1. F 1loating Point Ops
2. Activation Func
3. Matrix Mult.

SMSP 1 [RP2040]

CORE 0 (IO)
1. PIO RX Manager
2. Fill FIFO
3. Sync Signals

[FIFO]

CORE 1 (ALU)
1. F 1loating Point Ops
2. Activation Func
3. Matrix Mult.

SMSP 2 [RP2040]

CORE 0 (IO)
1. PIO RX Manager
2. Fill FIFO
3. Sync Signals

[FIFO]

CORE 1 (ALU)
1. F 1loating Point Ops
2. Activation Func
3. Matrix Mult.

SMSP 3 [RP2040]

CORE 0 (IO)
1. PIO RX Manager
2. Fill FIFO
3. Sync Signals

[FIFO]

CORE 1 (ALU)
1. F 1loating Point Ops
2. Activation Func
3. Matrix Mult.

Logical "Warp" (32 Threads)
(Synchronized via SYNC_TRIG Signal)