ECE284 FA25 Progress Report

1. Group Name:

Little MAC

2. Group Member's Names (separated by commas):

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3. Make a github repo and add all your team members.
4. Add the teaching staff (Make sure we have access to your repo if it is not public)
    a. shantanu-exe
    b. maria-s8
    c. supermingu
5. Add the github repo link here:

https://github.com/Daniel-Tran3/ECE_253_Project

6. Please commit/push your code **by the end of your team's poster presentation day**.
    a. This is not what will be used to grade your final report. This is just to make sure you completed what you mentioned in the poster.
7. Your github repo should have the following folders. Avoid adding vcd to github. Add it to your gitignore. If you can add a readme doc to the github it would be nice (though not necessary).
    a. Part-1
        i. Add all the files here
    b. Part-2
        i. Add all the files here
    c. Part-3
        i. Add all the files here
    d. Poster
        i. Add PDF of your poster here
    e. Alpha
        i. Alpha 1
        ii. Alpha 2
        iii. Alpha 3
        iv. More folders if you want

8. Fill the table below (Update the table as needed):

Item	Current Status (Edit as what describes your status best)	Note

Part1	Complete	Please alter row, column, len_nij, len_onij, o_ni_dim, and a_pad_ni_dim parameters in core_tb.v according to the test input used. (They are used to calculate nij' in the testbench). This applies to all parts below, including alphas. Activations should be stored in activations.txt in the Part-1 directory. Weights are in the form weight_[kij].txt, where [kij] is substituted by kij value. PSUMs (used for intermediate verification) are in the form psum_[kij].txt, where [kij] is substituted by kij value. Outputs are in out.txt.
Part2	Complete	Please separate input files into two directories in Part-2. P1_Files should have activation.txt as well as two directories - Tile0 and Tile1. In each of the Tile directories, please list the outputs for that tile (in 8 col by len_onij format) in out.txt, as well as the psum_[kij].txt files and weight_[kij].txt files). These should be for the 8x16 version, with tiling on the output channels and 4-bit activations. P2_Files should have the same structure, but instead of the regular 8x8 setup, the weights must be in the form of row14col0,row12col0,...,row0 col0 on one line followed by row15col0,row13col0,...,row1

		col0 on the next, repeated for every column. These should be for the 16x16 version with 2-bit activations. The activations should be in the form of row15time0,row14time0,...,row0time0 on one line followed by time1 on another line).
Part3	Complete	Create a directory called OSWS_Files in the root directory. Provide output.txt, activation.txt, and weights_*.txt as in part 1, except that the weights should be transposed; thus, each line should contain the weights for PE columns 7-0, i.e. they should contain the weights corresponding to channels 7-0, for each input channel from 0-7. In order for output-stationary computation to work, there must exist an activation_os.txt file that contains the activations in a specific pattern. For each input channel from 0-7 within the (only) tile, each of these lines must be appended to the activation_os.txt file: Nij0…nij3 nij6…nij9 Nij1…nij4 nij7…nij10 Nij2…nij5 nij8…nij11 Nij6…nij9 nij12…nij15 Nij7…nij10 nij13…nij16 Nij8…nij11 nij14…nij17 Nij12…nij15 nij18…nij21 Nij13…nij16 nij19…nij22 Nij14…nij17 nij20…nij23
Alpha 1 (Clock Gating)	Complete	Clock gating to turn off different blocks when not used (such as activation SRAMs after loading).

		Same input file format as Part-1.
Alpha 2 (Dual Core)	Complete	Dual instantiation of corelet to achieve 2x throughput on 16 output channels compared to tiling. Same input file format as Part-2.
Alpha 3 (Activation Configurability)	Complete	Allows configurability of activation function between ReLU and LeakyReLU. Please change relu_en and lrelu_en (turn the one that you want to use to 1) and shift (values can be from 0-3) according to what activation function you want. Also, follow Part-1 input file format.
Alpha 4 (Row and Column Parameterizability)	Complete	Follow Part-1 input file format. Generate the files according to part 1, but extend the number of entries per line or number of lines depending on how many rows/columns you have.
Alpha 5 (Input channel tiling)	Complete	The core can be programmed to perform input channel tiling In weight-stationary, it retrieves partial sums computed for previous input channel tiles and feeding them back into the corelet to be accumulated on. In output stationary, it simply fetches weights/activations for all input tiles into SRAM and streams them out such that each tile performs MACs on all weight*activation pairings relevant for that particular tile's assigned (nij, out_channel) pairing. There must exist a P16x8_Files directory in the

		root directory. Within it are all the weights, activations, and ground truths. There must exist two directories in P16x8_Files: Tile0, and Tile1. Within each Tile* directory, each respective files' weight.txt and activation.txt must exist; their formats should match those used in Part 1. Within the base P16x8_Files directory (outside Tile0/Tile1), there should exist an out_no_relu.txt and an out_relu.txt file, which contain the un-activated partial sums and the post-activation (ReLU) partial sums respectively, in the same format for out.txt as in the original Part 3. Additionally, the P16x8_Files directory must include an activation_os.txt directory. It should be the activations of Tile0 and Tile1, converted to the output-stationary format described in Part 3 and concatenated together (Tile0 appears in the first lines, then Tile 1).
Alpha 6 (In-place accumulation)	Complete	The core performs weight-stationary accumulation in-place for each pair of (output channel, nij) by performing the nij' offset computation from nij to determine the appropriate sequence of accesses needed from the set of activations. This is implemented as a part of Part 3, so please perform testing in the Part 3 folder and use Part 3 instructions.

Alpha 7 (Formal Verification)	Complete	Please move the files from the data folders (to the appropriate test_dir), according to the input file format of the Part that it is verifying for.