Below is the program files description:

Program files for Question 1:-

We have three predictors to test for question 1. All the steps to get program files for question 1 is below:

    1. Go to the folder named Solution_1.

    2. G-share folder have implementation for G-share predictor,

    3. Perceptron folder have implementation for Perceptron predictor and

    4. Tage folder have implementation for Tage predictor.

Program files for Question 2

In question 2 we are trying three variations in tage predictor:

1. Variation in number of entries in Tage table.
2. Variation in tag bit size.
3. Variation in min History and max history.

Program files for Variation 1 are inside folder Variation_1:

1. Tage_size_512 have implementation for Tage predictor variant with 512 entries in each tage component i.e no of entries in Tage table.
2. Tage_size_2048 have implementation for Tage 2048 predictor variant with 2048 entries in each tage component.
3. Tage_size_8192 have implementation for Tage predictor variant with 8192 entries in each tage component i.e no of entries in Tage table.

Program files for Variation 2 are inside folder Variation_2:

1. Tage_bitsize_7 have implementation for Tage predictor variant with tag bit size of 7 bits.
2. Tage_bitsize_11 have implementation for Tage predictor variant with tag bit size of 11 bits.
3. Tage_bitsize_15 have implementation for Tage predictor variant with tag bit size of 15 bits.

Program files for Variation 3 are inside folder Variation_3

We have two sub variation for part 3

a) Variation in maximum history length

Program files for max history variation available at folder Variation_3/max-history, inside max-history folder:
1. Tage_max_history_64 have implementation for Tage predictor variant with max-history length 65.
2. Tage_max_history_131 have implementation for Tage predictor variant with max-history length 131.
3. Tage_max_history_255 have implementation for Tage predictor variant with max-history length 255.

b) Variation in minimum history length

Program files for max history variation available at folder Variation_3/max-history, inside max-history folder:
1. Tage_min_history_5 have implementation for Tage predictor variant with minimum history length 5.
2. Tage_min_history_10 have implementation for Tage predictor variant with minimum history length 10.
3. Tage_min-history_40 have implementation for Tage predictor variant with minimum history length 40.

Program files for Question 3

Program files for hybrid predictors are in folder Solution_3

1. Hybrid_30 contains implementation for hybrid predictor with 30 percent budget allocation for Perceptron predictor and 70 percent budget allocation for Tage predictor.
2. Hybrid_50 contains implementation for hybrid predictor with 50 percent budget allocation for Perceptron predictor and 50 percent budget allocation for Tage predictor.
3. Hybrid_70 contains implementation for hybrid predictor with 70 percent budget allocation for Perceptron predictor and 30 percent budget allocation for Tage predictor.

Steps to test predictor on traces:-

Step 1. Get open source code for Champsim simulator from
https://github.com/ChampSim/ChampSim.

Step 2. Download dependencies using below commands in terminal.

      $ git submodule update --init

      $ vcpkg/bootstrap-vcpkg.sh

      $ vcpkg/vcpkg install

Step 3 . Go to Champsim/btb folder. Open basic_btb.cc file.

Step 4 . As we have budget constraint of having 2048 entries in btb. Update entry BTB_SET to 512 and BTB_WAY =4.

Step 5. Take the program file of needed predictor that you want to test from appropriate folders mentioned above and paste it inside Champsim/branch folder.

Step 6:- Open champsim_config.json file present inside Champsim folder.

Step 7:- Set branch_predictor to the name of folder which contains implementation for predictor that need to be tested and save the file.

Step 8. Run below command to make binary executable file for champsim.

      $ ./config.sh champsim.config.json

      $ make

Above command will create a binary executable file inside Champsim/bin folder.

Step 9 :- Run below command

      $ bin/champsim –warmup-instructions 200000000 –simulation-instructions 500000000 ~/path/to/traces/trace_name

where "champsim" is the binary executable we got from previous step.

"~/path/to/traces" is the path to the folder which contain traces.

"trace_name" is name of the trace on which predictor will be tested.

Step 10:- Note the MPKI,IPC and Accuracy reported by predictor.