Draw the 2-bit branch prediction FSM. Then, given the 2-bit branch prediction method, with the initial state of N*, and the following set of branches, Describe the set of branch predictions

N, N, T, T, N, N, T, N, N

Draw the 2-bit branch prediction FSM*. Then, given the following branch addresses and branches, show the final state of a k=3 correlating prediction model

10001101	T
10001101	T
10001000	T
10001111	N
10001000	N
10001101	T
10001000	T
10001000	T
10001000	T

Assume 40% of instructions change the flow of a program

- 16% of instructions are branches
  - 50% of branches are taken
  - Mispredicted branches result in a 3 cycle stall (wait for address to be calculated)
- 24% of instructions are loads
  - 50% of the time, the next instruction uses the loaded value

What is the impact on performance assuming:

- There is a 1 cycle stall for load hazard
- Always predict branch not taken
- 5-stage datapath

Let's say we have a database with 8,973 entries. Each contains:

- Name: char array – Up to 50 characters
- Department: char array - Up to 12 characters
- Section: char array - Up to 8 characters
- Additional: char array - Up to 50 characters
- GPA: double
- ID: Unsigned integer

Determine the amount of memory consumed storing these entries on a Disk with block of 512 bytes using both segmentation and paging. Draw the layout of the first three blocks for each.