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Pre-class Assignment #15

1. Define the following terms:
   - temporal locality: Programs tend to reference the same instructions and data that they had recently accessed.
   - spatial locality: Programs tend to reference instructions and data near those that have been recently accessed.
   - prefetch: To bring data into a cache before it is needed.
   - write-back: A cache where updates can be stored in the cache and only sent to memory when the cache runs out of space.
   - working set: The set of memory locations that a program has referenced in the recent past.

2. Suppose an application is assigned four frames of physical memory (PFNs 1-4), and these page frames are initially empty. The application then references pages in the following sequence (using letters for VPN references in the manner of the textbook). Using the diagram format of the textbook, show how the system would fault pages into the four frames of physical memory using an ascending placement policy when empty page frames exist and then the FIFO replacement policy once there are no more empty page frames. (The textbook shows the VPN letter to designate a miss and shows a + to designate a hit.)
   VPN references: A C B D B A E F B F A G E F A

FIFO

Ref	A	C	B	D	B	A	E	F	B	F	A	G	E	F	A
1	A					+	E						+		
2		C						F		+				+	
3			B		+				+		A				+
4				D								G			

3. Repeat but use the LRU replacement policy.

LRU

Ref	A	C	B	D	B	A	E	F	B	F	A	G	E	F	A
1	A					+					+				+
2		C					E					G			
3			B		+				+				E		
4				D				F		+				+	

4. Repeat but use the MIN replacement policy.

MIN

Ref	A	C	B	D	B	A	E	F	B	F	A	G	E	F	A
1	A					+					+				+
2		C					E						+		
3			B		+				+			G			
4				D				F		+				+	