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1.

LRU:

7	1	2	3	1	2	5	3	4	6	7	7	1	0	5	4	7	6	2	3	0	1
7	7	7	3	3	3	5	5	5	6	6	6	6	0	0	0	7	7	7	3	3	3
	1	1	1	1	1	1	3	3	3	7	7	7	7	5	5	5	6	6	6	0	0
		2	2	2	2	2	2	4	4	4	4	1	1	1	4	4	4	2	2	2	1
Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

19 Page Faults

FIFO:

7	1	2	3	1	2	5	3	4	6	7	7	1	0	5	4	7	6	2	3	0	1
7	7	7	3	3	3	3	3	3	6	6	6	6	0	0	0	7	7	7	3	3	3
	1	1	1	1	1	5	5	5	5	7	7	7	7	5	5	5	6	6	6	0	0
		2	2	2	2	2	2	4	4	4	4	1	1	1	4	4	4	2	2	2	1
Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

18 Page Faults

Optimal:

7	1	2	3	1	2	5	3	4	6	7	7	1	0	5	4	7	6	2	3	0	1
7	7	7	3	3	3	3	3	4	6	7	7	7	7	7	7	7	7	7	7	7	7
	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
		2	2	2	2	5	5	5	5	5	5	5	5	5	4	4	6	2	3	3	1
Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	N	N	Y	N	Y	N	Y	Y	Y	N	Y

14 Page Faults

2. For 1 bit to fail in 64 bit data chunk with no ECC. Binomial probability $\frac{n!}{x!(n-x)!}p^x(1-p)^{n-x} = 6.4 * 10^{-9}$

   Failure to correct errors will be at least 2 bits fail.
   $P[at\ least\ 2] = 1 - (p[no\ error] + p[1\ error])$
   Binomial probability (accounting for 72 bits): $1 - \left(\frac{72\left(1-\frac{1}{10^{10}}\right)^{71}}{10^{10}} + \left(1-\frac{1}{10^{10}}\right)^{72}\right) = 2.556 * 10^{-17}$

3. For a correct cache coherence protocol we run all of P1 first and then run P2.
   Which means that for the values X[0] and X[1] at the end of P1 we have X[0] = 2 & X[1] = 4
   So that in P2 we get A = 2, B = 4

   For an incoherent protocol we get can get that X[0] is not updated properly and the same for X[1] so we can show X[0] = X[1] = A = B = 0.

4. There are 12 processes made.

5. Line A is the return of the fork on pid. Because it is a child it is 0. getpid() actually gets the real id of the child which is Line B = 2603. Line C is run from the parent, and the pid return is the child id so Line C = 2603. And Line D getpid() is of the current process which is parent so Line D = 2600.
   Line A = 0
   Line B = 2603
   Line C = 2603
   Line D = 2600

6. The output at line A will be 5. PID is not set to 0 in the parent so it does not add 15