									LSN	undo
									being	Next
LSN	prevLSN	TransID	Type	PageID	Length	Offset	Before	After	undone	LSN
990	0	T3	Update	P30	3	20	ABC	DEF		
991	989	T2	Update	P10	3	1	123	456		
992	991	T2	Commit							
993	992	T2	End_trans							
994	0	T4	Update	P20	2	10	GH	IJ		
995	994	T4	Update	P40	4	20	40	41		
996	0		Beg_ckpt							
997	0		End_ckpt (Trans table, {(T3, 990), (T4, 995)}, Dirty Page Table {(P30, 990), (P40, 995), (P20, 994)}							
998	990	T3	Update	P30	4	10	10	11		
999	0	T5	Update	P50	4	20	12	13		
1000	0	T6	Update	P60	4	19	15	16		
1001	995	T4	Abort							
1002	998	T3	Update	P30	4	10	11	12		
1003	1001	T4	CLR	P40	4	20	41	40	995	994
1004	999	T5	Update	P50	2	2	Mm	Nn		
1005	1004	T5	Update	P50	2	2	Nn	Oo		
1006	1003	T4	CLR	P20	2	10	IJ	GH	994	0
1007	1000	T6	Update	P60	3	8	ABC	XYZ		
1008	1006	T4	End_trans							
1009	0	T7	Update	P70	1	0	K	M		
1010	1005	T5	Commit							
CRASH										

Trans table after analysis phase

Trans table				Dirty Page Table	
Trans ID	LastLSN	Status		PageID	recLSN
T3	1002	U		P30	990
T5	1010	C		P40	995
T6	1007	U		P20	994
T7	1009	U		P50	999
				P60	1000
				P70	1009

Pages in buffer after redo

PageID	PageLSN
P10	991
P20	1006
P30	1002
P40	1003
P50	1005
P60	1007
P70	1009

Undo phase - Identify list of uncommitted transactions - T3, T6, T7
Write Abort records for all three.
Build toUndo set {1002, 1007, 1009}

Process 1009 - update record, write CLR, undo changes, update pageLSN of P70 to 1015
prevLSN is null - write endTrans for T7, toUndo = {1002, 1007}
Process 1007 - update record, write CLR, undo changes, update pageLSN of P60 to 1017
prevLSN is 1000 - toUndo = {1000, 1002}
Process 1002 - update record, write CLR, undo changes, update pageLSN of P30 to 1018
prevLSN is 998 - to Undo = {998, 1000}
Process 1000 - update record, write CLR, undo changes, update pageLSN of P60 tp 1019
prevLSN is null, write endTrans for T6, toUndo = {998}
Process 998 - update record, write CLR, undo changes, update pageLSN of P30 to 1021
prevLSN is 990 - toUndo = {990}
Process 990 - update record, write CLR, undo changes, update pageLSN of P30 to 1022
prevLSN is null, write endTrans for T3, toUndo = {}

Finished

Trans table empty
Dirty page table unchanged from redo

Pages in buffer after undo

Page #	PageLSN
P10	991
P20	1006
P30	1022
P40	1003
P50	1005
P60	1019
P70	1015

									LSN	undo
									being	Next
LSN	prevLSN	TransID	Type	PageID	Length	Offset	Before	After	undone	LSN
990	0	T3	Update	P30	3	20	ABC	DEF		
991	989	T2	Update	P10	3	1	123	456		
992	991	T2	Commit							
993	992	T2	End_trans							
994	0	T4	Update	P20	2	10	GH	IJ		
995	994	T4	Update	P40	4	20	40	41		
996	0	0	Beg_ckpt							
997	0		End_ckpt (Trans table, {(T3, 990), (T4, 995)}, Dirty Page Table {(P30, 990), (P40, 995), (P20, 994)}							
998	990	T3	Update	P30	4	10	10	11		
999	0	T5	Update	P50	4	20	12	13		
1000	0	T6	Update	P60	4	19	15	16		
1001	995	T4	Abort							
1002	998	T3	Update	P30	4	10	11	12		
1003	1001	T4	CLR	P40	4	20	41	40	995	994
1004	999	T5	Update	P50	2	2	Mm	Nn		
1005	1004	T5	Update	P50	2	2	Nn	Oo		
1006	1003	T4	CLR	P20	2	10	IJ	GH	994	0
1007	1000	T6	Update	P60	3	8	ABC	XYZ		
1008	1006	T4	End_trans							
1009	0	T7	Update	P70	1	0	K	M		
1010	1004	T5	Commit							
1011	1010	T5	End_trans							
1012	1009	T7	Abort							
1013	1007	T6	Abort							
1014	1002	T3	Abort							
1015	1112	T7	CLR	P70	1	0	M	K	1009	0
1016	1015	T7	End_trans							
1017	1013	T6	CLR	P60	3	8	XYZ	ABC	1007	1000
1018	1014	T3	CLR	P30	4	10	12	11	1002	998
1019	1017	T6	CLR	P60	4	19	16	15	1000	0
1020	1019	T6	End_trans							
1021	1018	T3	CLR	P30	4	10	11	10	998	990
1022	1021	T3	CLR	P30	3	20	DEF	ABC	990	0
1023	1022	T3	End_trans							

Restart transactions T3, T6, T7