

LOC	OBJECT CODE	ADDR1	ADDR2	STMT
				2 *****
				3 * TXFPER.ASM
				4 *****
				5 *
				6 * This program performs a PER instruction trace of TXF transactions.
				7 * It enables PER instruction fetch events for a range of instructions
				8 * that includes two transactions.
				9 *
				10 * The first transaction, a constrained transaction, and a separate
				11 * second transaction being an unconstrained transaction with another
				12 * unconstrained transaction nested within it.
				13 *
				14 * Two tests are performed: the first test is performed with both the
				15 * Instruction Fetch (IF) and Event-Suppression (ES) PER flags set.
				16 * It should trace all instructions except for the instructions that
				17 * comprise the actual transactions themselves (i.e. the instructions
				18 * from, and including, the outermost TBEGIN/C instruction through
				19 * the TEND instruction that ends the transaction, are NOT traced).
				20 *
				21 * The second test adds the IFetch Nullification (IFNUL) and TEND PER
				22 * Event flags to the mix. The second test should trace everything
				23 * the first test traced, but in addition, should also trace both the
				24 * TBEGIN/C and TEND instructions themselves too. This is controlled
				25 * by special Program Interrupt handling logic.
				26 *
				27 *****
00000000		00000000	00000657	29 TXFPER START 0
		00000000		30 USING TXFPER,R0
00000000		00000000	0000008C	32 ORG TXFPER+X'8C' Program interrupt code
0000008C	00000000			33 PGMCODE DC F'0' Program interrupt code
		00000080	00000001	34 PGM_PER_EVENT EQU X'80' PER Event program interrupt code
				35
00000090		00000090	00000096	37 ORG TXFPER+X'96' PER interrupt fields
00000096	0000			38 PERCODE DC XL2'00' PER interrupt code
00000098	00000000 00000000			39 PERADDR DC AD(0) PER interrupt address
		00000150	00000000	41 PGMOPSW EQU TXFPER+X'150' z Program Old PSW
000000A0		000000A0	000001A0	43 ORG TXFPER+X'1A0' z Restart New PSW
000001A0	00000001 80000000			44 DC X'0000000180000000'
000001A8	00000000 00000200			45 DC AD(GO)
000001B0		000001B0	000001D0	47 ORG TXFPER+X'1D0' z Program New PSW
000001D0	00000001 80000000			48 DC X'0000000180000000'
000001D8	00000000 00000394			49 DC AD(PGMRUPT)

LOC	OBJECT CODE	ADDR1	ADDR2	STMT
				51 *****
				52 * Start of actual program...
				53 *****
000001E0		000001E0	00000200	55 ORG TXFPER+X'200'
				57 *****
				58 * Perform basic TXF sanity checks...
				59 *****
00000200	4100 001F		0000001F	61 GO LA R0,(L'FACLIST/8)-1 Store Facility List
00000204	B2B0 0520		00000520	62 STFLE FACLIST
00000208	9120 0520		00000520	64 TM FACLIST+ZAFACBYT,ZAFACBIT z/Arch mode?
0000020C	A784 020E		00000628	65 JZ ZAFAIL
00000210	9140 0526		00000526	67 TM FACLIST+PAFACBYT,PAFACBIT PPA available?
00000214	A784 020E		00000630	68 JZ PAFAIL
00000218	9140 0529		00000529	70 TM FACLIST+TXFACBYT,TXFACBIT TXF available?
0000021C	A784 0212		00000640	71 JZ TXFAIL
00000220	9120 0526		00000526	73 TM FACLIST+CTFACBYT,CTFACBIT Constrained TXF?
00000224	A784 020A		00000638	74 JZ CTFAIL
				76 *****
				77 * Enable TXF
				78 *****
00000228	EB00 0620 0025		00000620	80 STCTG R0,R0,CTL0 Save CR0
0000022E	E300 0620 0004		00000620	81 LG R0,CTL0 Load into GR0
00000234	A508 0080			82 OIHH R0,CR0TXF Enable TXF flag
00000238	E300 0620 0024		00000620	83 STG R0,CTL0 Save GR0
0000023E	EB00 0620 002F		00000620	84 LCTLG R0,R0,CTL0 Load CR0
				86 *****
				87 * Begin tests...
				88 *****
00000244	EB9B 04E0 002F		000004E0	90 LCTLG R9,R11,PERCTL Init CR9-CR11 PER Control Registers
0000024A	8000 0518		00000518	91 SSM ENPER Enable Program Event Recording
0000024E	45E0 0272		00000272	92 BAL R14,CTRANS Execute a Constrained Transaction
00000252	45E0 028A		0000028A	93 BAL R14,UTRANS Execute an Unconstrained Transaction
00000256	92F2 033C		0000033C	95 MVI MSGCMD+14,C'2' Test #2...
0000025A	D203 04E4 0648	000004E4	00000648	96 MVC PERCTL+4(4),=A(CR9_IF+CR9_IFNUL+CR9_SUPPRESS+CR9_TEND)
00000260	EB9B 04E0 002F		000004E0	97 LCTLG R9,R11,PERCTL New CR9-CR11 PER Control Registers
00000266	45E0 0272		00000272	98 BAL R14,CTRANS Execute a Constrained Transaction
0000026A	45E0 028A		0000028A	99 BAL R14,UTRANS Execute an Unconstrained Transaction
0000026E	A7F4 0135		000004D8	100 J SUCCESS Done!

LOC	OBJECT CODE	ADDR1	ADDR2	STMT	
				102	*****
				103	* Dummy Transactions to be Traced...
				104	*****
		00000272	00000001	106	BEGRANGE EQU * Begin of PER Range
00000272	4111 1001		00000001	108	CTrans LA R1,1(R1,R1)
00000276	E561 0000 0000		00000000	109	TBEGINC 0,0 Begin Constrained Transaction
0000027C	4122 2002		00000002	110	LA R2,2(R2,R2)
00000280	B2F8 0000			111	TEND , End of Transaction
00000284	4133 3003		00000003	112	LA R3,3(R3,R3)
00000288	07FE			113	BR R14 Return to caller
0000028A	A729 2000			115	UTrans LGHI R2,X'2000' R2 --> TDB
0000028E	1FFF			116	SLR R15,R15 R15 <= failure count = none yet
00000290	E560 2000 FE00		00000000	117	URETRY TBEGIN 0(R2),X'FE00' unconstrained, WITH TDB, save R0-R13
00000296	A774 0012		000002BA	118	JNZ UFAILED CC != 0: aborted or can't be started
0000029A	4144 4004		00000004	119	LA R4,4(R4,R4)
0000029E	E560 0000 0000		00000000	120	TBEGINC 0,0 Begin Nested Transaction
000002A4	4155 5005		00000005	121	LA R5,5(R5,R5)
000002A8	B2F8 0000			122	TEND , End of Nested Transaction
000002AC	4166 6006		00000006	123	LA R6,6(R6,R6)
000002B0	B2F8 0000			124	TEND , End of Outermost Transaction
000002B4	4177 7007		00000007	125	USkip LA R7,7(R7,R7)
000002B8	07FE			126	BR R14 Return to caller
000002BA	A744 000E		000002D6	128	UFAILED BRC CC1,UFAILCC1 Indeterminate condition (unexpected)
000002BE	A714 0010		000002DE	129	BRC CC3,UFAILCC3 Persistent condition (unexpected)
000002C2	A7FA 0001			131	AHI R15,1 Increment temporary failure count
000002C6	A7FE 0003			132	CHI R15,3 Have we reached our maximum retry?
000002CA	A7B4 FFF5		000002B4	133	JNL USkip Yes, then do it the hard way
000002CE	B2E8 10F0			135	PPA R15,0,1 Otherwise request assistance
000002D2	A7F4 FFDF		00000290	136	J URETRY And try the transaction again
000002D6	9206 0517		00000517	138	UFAILCC1 MVI BADPSW+16-1,6 Unexpected CC1
000002DA	A7F4 0101		000004DC	139	J FAILURE FAIL test
000002DE	9207 0517		00000517	140	UFAILCC3 MVI BADPSW+16-1,7 Unexpected CC3
000002E2	A7F4 00FD		000004DC	141	J FAILURE FAIL test
		000002E6	00000001	143	ENDRANGE EQU * End of PER Range

LOC	OBJECT CODE	ADDR1	ADDR2	STMT	
				145 *****	
				146 * Issue Hercules MESSAGE pointed to by R1, length in R0	
				147 *****	
000002E6	1200			149 MSG LTR R0,R0	Do we even HAVE a message?
000002E8	078F			150 BZR R15	No, ignore
000002EA	9002 031C		0000031C	152 STM R0,R2,MSGSAVE	Save registers
000002EE	4900 0650		00000650	153 CH R0,=AL2(L'MSGMSG)	Message length within limits?
000002F2	47D0 02FA		000002FA	154 BNH MSGOK	Yes, continue
000002F6	4100 0015		00000015	155 LA R0,L'MSGMSG	No, set to maximum
000002FA	1820			157 MSGOK LR R2,R0	Copy length to work register
000002FC	0620			158 BCTR R2,0	Minus-1 for execute
000002FE	4420 0328		00000328	159 EX R2,MSGMVC	Copy message to O/P buffer
00000302	4120 2012		00000012	160 LA R2,1+L'MSGCMD(,R2)	Calculate true command length
00000306	4110 032E		0000032E	161 LA R1,MSGCMD	Point to true command
0000030A	83120008			163 DC X'83',X'12',X'0008'	Issue Hercules Diagnose X'008'
0000030E	4780 0314		00000314	164 BZ MSGRET	Return if successful
00000312	0000			165 DC H'0'	** CRASH ** otherwise!
00000314	9802 031C		0000031C	167 MSGRET LM R0,R2,MSGSAVE	Restore registers
00000318	07FF			168 BR R15	Return to caller
0000031C	00000000 00000000			170 MSGSAVE DC 3F'0'	Registers save area
00000328	D200 033F 1000	0000033F	00000000	171 MSGMVC MVC MSGMSG(0),0(R1)	Executed instruction
0000032E	D4E2C7D5 D6C8405C			173 MSGCMD DC C'MSGNOH * Test 1: '	
0000033F	F1F2F3F4 F5F6F7F8			174 MSGMSG DC C'12345678 ==> 12345678',C' ' (extra byte for unpk)	
				176 *****	
				177 * Trace instructions that was either fetched or executed	
				178 *****	
00000356	F384 033F 009C	0000033F	0000009C	180 ITRACE UNPK MSGMSG(9),PERADDR+4(5)	Address of instruction
0000035C	9240 0347		00000347	181 MVI MSGMSG+8,C' '	
00000360	DC07 033F 0294	0000033F	00000294	182 TR MSGMSG(8),HEXCHARS-X'F0'	
00000366	5810 009C		0000009C	184 L R1,PERADDR+4	The instruction itself
0000036A	F384 034C 1000	0000034C	00000000	185 UNPK MSGMSG+13(9),0(5,R1)	
00000370	DC07 034C 0294	0000034C	00000294	186 TR MSGMSG+13(8),HEXCHARS-X'F0'	
00000376	4110 033F		0000033F	188 LA R1,MSGMSG	
0000037A	4100 0015		00000015	189 LA R0,L'MSGMSG	
0000037E	45F0 02E6		000002E6	190 BAL R15,MSG	"Trace" the instruction
00000382	07FE			191 BR R14	
00000384	F0F1F2F3 F4F5F6F7			193 HEXCHARS DC CL16'0123456789ABCDEF'	

LOC	OBJECT	CODE	ADDR1	ADDR2	STMT				
					195	*****			
					196	* Program Interrupt Handler...			
					197	*****			
00000394	9180	008F		0000008F	199	PGMRUPT	TM	PGMCODE+3,PGM_PER_EVENT	Expected interrupt?
00000398	A784	0098		000004C8	200		JZ	ABORT	No?! ** ABORT!! **
0000039C	EB0F	0448	0024	00000448	201		STMG	R0,R15,PGMREGS	Save caller's registers
000003A2	4700	03BA		000003BA	203	TEST2BR	NOP	PGMTEST2	Branch ==> Test 2 logic
000003A6	9101	0096		00000096	204		TM	PERCODE,X'01'	CR9_IFNUL = Test 2 yet?
000003AA	4710	03B6		000003B6	205		BO	BEGTEST2	Yes, Test 2 has begun
000003AE	45E0	0356		00000356	206		BAL	R14,ITRACE	Trace executed instruction
000003B2	47F0	043C		0000043C	207		B	PGMRET	(still Test 1)
000003B6	92F0	03A3		000003A3	209	BEGTEST2	MVI	TEST2BR+1,X'F0'	Activate Test 2 logic
000003BA	E310	0098	0004	00000098	210	PGMTEST2	LG	R1,PERADDR	R1 --> instruction
000003C0	D501	1000	0652	00000652	211		CLC	0(2,R1),=XL2'E560'	TBEGIN?
000003C6	4780	0408		00000408	212		BE	PGMTBEG	Yes
000003CA	D501	1000	0654	00000654	213		CLC	0(2,R1),=XL2'E561'	TBEGINC?
000003D0	4780	0408		00000408	214		BE	PGMTBEG	Yes
000003D4	9102	0096		00000096	215		TM	PERCODE,X'02'	TEND PER event?
000003D8	4710	042C		0000042C	216		BO	PGMTEND	Yes
000003DC	9101	0096		00000096	218		TM	PERCODE,X'01'	CR9_IFNUL event?
000003E0	4780	03F8		000003F8	219		BZ	NOTIFNUL	No, turn it back on
000003E4	45E0	0356		00000356	220		BAL	R14,ITRACE	Trace fetched instruction
000003E8	D203	04E4	064C	0000064C	221		MVC	PERCTL+4(4),=A(CR9_IF+CR9_SUPPRESS+CR9_TEND)	
000003EE	EB9B	04E0	002F	000004E0	222		LCTLG	R9,R11,PERCTL	Turn off Nullify
000003F4	47F0	043C		0000043C	223		B	PGMRET	Go EXECUTE this instruction
000003F8	D203	04E4	0648	00000648	225	NOTIFNUL	MVC	PERCTL+4(4),=A(CR9_IF+CR9_IFNUL+CR9_SUPPRESS+CR9_TEND)	
000003FE	EB9B	04E0	002F	000004E0	226		LCTLG	R9,R11,PERCTL	Turn Nullify back on again
00000404	47F0	043C		0000043C	227		B	PGMRET	Go TRACE next instruction
00000408	9101	0096		00000096	229	PGMTBEG	TM	PERCODE,X'01'	CR9_IFNUL event?
0000040C	4710	0418		00000418	230		BO	PGMTBEG2	Yes, expected
00000410	9299	0517		00000517	231		MVI	BADPSW+16-1,X'99'	NO!? UNEXPECTED!!
00000414	A7F4	0064		000004DC	232		J	FAILURE	
00000418	45E0	0356		00000356	233	PGMTBEG2	BAL	R14,ITRACE	Trace the TBEGIN...
0000041C	D203	04E4	064C	0000064C	234		MVC	PERCTL+4(4),=A(CR9_IF+CR9_SUPPRESS+CR9_TEND)	
00000422	EB9B	04E0	002F	000004E0	235		LCTLG	R9,R11,PERCTL	Switch to TXSUSPEND mode
00000428	47F0	043C		0000043C	236		B	PGMRET	Go execute the transaction
0000042C	45E0	0356		00000356	238	PGMTEND	BAL	R14,ITRACE	Trace the TEND...
00000430	D203	04E4	0648	00000648	239		MVC	PERCTL+4(4),=A(CR9_IF+CR9_IFNUL+CR9_SUPPRESS+CR9_TEND)	
00000436	EB9B	04E0	002F	000004E0	240		LCTLG	R9,R11,PERCTL	Switch back to NULLIFY mode
					241	*	B	PGMRET	Go trace next instruction
0000043C	EB0F	0448	0004	00000448	243	PGMRET	LMG	R0,R15,PGMREGS	Restore caller's registers
00000442	B2B2	0150		00000150	244		LPSWE	PGMOPSW	Return to caller...
00000448	00000000	00000000			246	PGMREGS	DC	16D'0'	Saved GR registers 0 - 15

LOC	OBJECT CODE	ADDR1	ADDR2	STMT
				248 *****
				249 * ABORT test run due to unexpected program interrupt
				250 *****
000004C8	D201 0512 0656	00000512	00000656	252 ABORT MVC BADPSW+8+2(2),=XL2'DEAD'
000004CE	D203 0514 008C	00000514	0000008C	253 MVC BADPSW+16-L'PGMCODE(L'PGMCODE),PGMCODE
000004D4	A7F4 0004		000004DC	254 J FAILURE
				256 *****
				257 * Successful completion / Abnormal termination
				258 *****
000004D8	B2B2 04F8		000004F8	260 SUCCESS LPSWE GOODPSW Load test completed successfully PSW
000004DC	B2B2 0508		00000508	261 FAILURE LPSWE BADPSW Load the test FAILED somewhere!! PSW
				263 *****
				264 * WORKING STORAGE
				265 *****
		40000000	00000001	267 CR9_IF EQU X'40000000' Instruction Fetch PER event
		02000000	00000001	268 CR9_TEND EQU X'02000000' TEND Instruction PER event
		01000000	00000001	269 CR9_IFNUL EQU X'01000000' IFetch Nullification PER event
		00400000	00000001	270 CR9_SUPPRESS EQU X'00400000' TXF Event-Suppression PER event
000004E0	00000000 40400000			272 PERCTL DC AD(CR9_IF+CR9_SUPPRESS) TEST 1 PER events
000004E8	00000000 00000272			273 DC AD(BEGRANGE) CR10 = Range begining address
000004F0	00000000 000002E6			274 DC AD(ENDRANGE) CR11 = Range ending address
000004F8	00020001 80000000			276 GOODPSW DC XL8'0002000180000000'
00000500	00000000 00000000			277 DC XL4'00000000',A(X'00000000')
00000508	00020001 80000000			279 BADPSW DC XL8'0002000180000000'
00000510	0000DEAD 000000FF			280 DC XL4'0000DEAD',A(X'000000FF') (FF = Reason for Failure)
00000518	40			282 ENPER DC B'01000000' Enable PER bit in PSW

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES															
ABORT	I	000004C8	6	252	200															
BADPSW	X	00000508	8	279	138	140	231	252	253	261	299	305	311	317						
BEGRANGE	U	00000272	1	106	273															
BEGTEST2	I	000003B6	4	209	205															
CC1	U	00000004	1	293	128															
CC3	U	00000001	1	294	129															
CR0TXF	U	00000080	1	292	82															
CR9_IF	U	40000000	1	267	272	96	221													
CR9_IFNUL	U	01000000	1	269	96															
CR9_SUPPRESS	U	00400000	1	270	272	96	221													
CR9_TEND	U	02000000	1	268	96	221														
CTFACBIT	U	00000020	1	310	73															
CTFACBYT	U	00000006	1	309	73															
CTFACNUM	U	00000032	1	308																
CTFAIL	I	00000638	4	311	74															
CTL0	D	00000620	8	291	80	81	83	84												
CTTRANS	I	00000272	4	108	92	98														
ENDRANGE	U	000002E6	1	143	274															
ENPER	B	00000518	1	282	91															
FACLIST	X	00000520	256	289	61	62	64	67	70	73										
FAILURE	I	000004DC	4	261	139	141	232	254	300	306	312	318								
GO	I	00000200	4	61	45															
GOODPSW	X	000004F8	8	276	260															
HEXCHARS	C	00000384	16	193	182	186														
IMAGE	1	00000000	1624	0																
ITRACE	I	00000356	6	180	206	220	233	238												
MSG	I	000002E6	2	149	190															
MSGCMD	C	0000032E	17	173	95	160	161													
MSGMSG	C	0000033F	21	174	155	171	180	181	182	185	186	188	189	153						
MSGMVC	I	00000328	6	171	159															
MSGOK	I	000002FA	2	157	154															
MSGRET	I	00000314	4	167	164															
MSGSAVE	F	0000031C	4	170	152	167														
NOTIFNUL	I	000003F8	6	225	219															
PAFACBIT	U	00000040	1	304	67															
PAFACBYT	U	00000006	1	303	67															
PAFACNUM	U	00000031	1	302																
PAFAIL	I	00000630	4	305	68															
PERADDR	A	00000098	8	39	180	184	210													
PERCODE	X	00000096	2	38	204	215	218	229												
PERCTL	A	000004E0	8	272	90	96	97	221	222	225	226	234	235	239	240					
PGMCODE	F	0000008C	4	33	199	253														
PGMOPSW	U	00000150	0	41	244															
PGMREGS	D	00000448	8	246	201	243														
PGMRET	I	0000043C	6	243	207	223	227	236												
PGMRUPT	I	00000394	4	199	49															
PGMTBEG	I	00000408	4	229	212	214														
PGMTBEG2	I	00000418	4	233	230															
PGMTEND	I	0000042C	4	238	216															
PGMTEST2	I	000003BA	6	210	203															
PGM_PER_EVENT	U	00000080	1	34	199															
R0	U	00000000	1	336	30	61	80	81	82	83	84	149	152	153	155	157	167	189	201	

MACRO DEFN REFERENCES

No defined macros

DESC	SYMBOL	SIZE	POS	ADDR
------	--------	------	-----	------

Entry: 0

Image	IMAGE	1624	000-657	000-657
Region		1624	000-657	000-657
CSECT	TXFPER	1624	000-657	000-657

STMT

FILE NAME

```
1 c:\Users\Fish\Documents\Visual Studio 2008\Projects\MyProjects\ASMA-0\TXFPER\TXFPER.asm
```

```
** NO ERRORS FOUND **
```