
Exploiting SyncSort for z/VSE

JOIN

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Introduction

The join facility of SyncSort for z/VSE provides the capability to join records from two source files. Each record from the first file with a given value in one or more fields (the join key) is joined to each record from the second file that has an identical value in its join key. The joined records are passed to the sort/copy process. The power of this facility is enhanced by the ability to eliminate records from either or both files and to control the disposition of paired and unpaired records resulting from the join operation.

This booklet will demonstrate through various examples how easy it is to create applications with the join facility. It is assumed that you have a basic understanding of SyncSort, its processing, and its control statements. For more details on the control statements and their syntax, see the *SyncSort for z/VSE Programmer's Guide*.

Join Processing Control Statement Summary

Join processing is controlled by three control statements: JOINKEYS, JOIN, and REFORMAT.

- JOINKEYS** Enables join feature processing and identifies the fields used to select records for join processing.
- JOIN** Specifies the disposition of paired and unpaired records in a join.
- REFORMAT** Defines the record layout to be produced by join processing.

Control Statement Summary Chart

The following table summarizes the parameters of each control statement and indicates default values.

Control Statement Name	Parameters	Delivered Default
JOINKEYS	FILE={F1/F2} FIELDS=(p ₁ ,l ₁ ,o ₁ [,p ₂ ,l ₂ ,o ₂ ,...[,p ₆₄ ,l ₆₄ ,o ₆₄]]) LRECL={nnn/(l ₁ [,l ₄])} TYPE={F/V} BLKSIZE=n BUFLIM=n BUFOFF=n BYPASS CLOSE={RWD/NORWD/UNLD} CRDSIZE=n DATA={E/A} {ENDREC/STOPAFT}=n {INCLUDE/OMIT}=(...) OPEN={RWD/NORWD} SORTED SPAN {STARTREC/SKIPREC}=n SYSIPT TOL VOLUME=n VSAM	BUFLIM=255 BUFOFF=0 CLOSE=RWD CRDSIZE=80 DATA=E OPEN=RWD

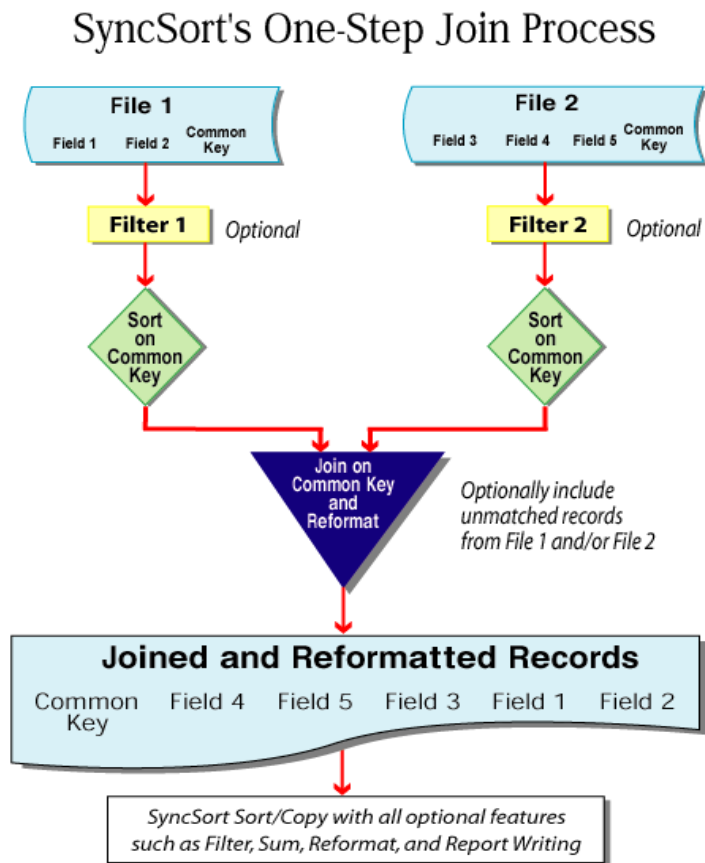
Control Statement Name	Parameters	Delivered Default
JOIN	UNPAIRED F1 F2 ONLY	
REFORMAT	FIELDS=(Fn:p ₁ ,l ₁ [[,Fn:]p ₂ ,l ₂ ...[[,Fn:]p _m][,Fn:p _n]) FILL=f	

Note: The JOIN, JOINKEYS, and REFORMAT control statements are not supported with any exits except for E35.

Join Processing Sequence

Join processing replaces the reading of the input data set (SORTIN) during a more traditional SORT or COPY. The records created by joining and reformatting are inserted into the SORT/COPY process immediately prior to record selection by the INCLUDE/OMIT control statement. Note that the specifications in all of the other control statements after join processing refer to the positions of the fields in the reformatted joined records.

The figure below illustrates the SyncSort join process:



EXAMPLES

The following are seven sample applications that demonstrate the power of the join facility of SyncSort VSE. Each example contains a statement of the problem, a sample of the inputs, SyncSort control statements used to produce the output, and a sample of the output.

Example 1

Simple Join with Record Selection

Problem

A business would like to identify customers who have not made any recent purchases in order to target them for a special promotion. The business is looking for a list that contains the names and addresses of customers whose last purchases were in 2003. The data required for this task are located in two separate files. The first file contains information related to each transaction. This file is sorted by the purchase date from the most recent to the oldest sales date. The second file contains the names and addresses of all the customers. There is a 10-digit customer number that is common to the records in both files.

Input File 1: Transaction File

(TYPE=F,LRECL=45,BLKSIZE=4500)

Position	Length	Description
1	10	Invoice Number
11	4	Payment Method
15	10	Customer Number
25	6	Purchase Date
31	6	Shipment Date
37	8	Invoice Amount
45	1	filler

	1	2	3	4	5	6	7
1	-----0	-----0	-----0	-----0	-----0	-----0	-----0
6456332132	GREG DAVIS		9 MOUNTAIN AVE		NORTH RIVER		AL
5435313132	MARK LUTZ		914 HILLCREST AVE		MILLBROOK		ME
7343423456	JUDY MAZUR		12 WINDING CREEK		RDNEWTON		CA
8933313321	ROGER SEALES		100 LOWER ST		HADLEY		WA
2135212331	GEORGE STORMS		9 EAST FIRST AVE		TUCKERVILLE		NM
5645321323	STEVE JONES		331 EILEEN TERRACE		COLUMBUS		NJ
3234139899	JAMES TUFARO		39 WICKHAM DRIVE		HARRISON		FL
9893133733	MEGAN MADRUS		136 PARK PLACE		GRAND ISLAND		WI
4233232989	ARTHUR HOFFMAN		25 BROOKSIDE DRIVE		BRANDT		SD
6462168111	MARCO BANNICO		255 NELSON BLVD		WARWICK		RI
7833452312	MONICA LALLEY		122 PARADISE RD		GREENVILLE		PA
7192837465	MARY FELDER		27 LAKEVIEW DRIVE		LAVA		FL

Approach

- JOINKEYS** Specifies the location in each file of the field (customer number) used to join the files. The INCLUDE parameter will filter out the records from file 1 that are not required for this application (purchases prior to 2003).
- REFORMAT** Defines the record layout to be produced by the join processing.
- SORT** Specifies the sort key and order (customer number, ascending). EQUALS is used to preserve the input order of the records (most recent purchases first).
- SUM** Reduces the number of records per customer to one, leaving only the most recent purchase.
- OUTFIL** Limits the records to only those for customers whose last purchase was in 2003, reformats the records, and adds headers for readability.

Note: The JOIN control statement is not required because the default is to join only the paired records.

Control Statements

```

JOINKEYS FILE=F1, FIELDS=(15,10,A), TYPE=F, LRECL=45, BLKSIZE=4500, CUSTOMER NUMBER
      INCLUDE=(25,6,Y2T,GE,Y'030101') ONLY SINCE 2003
JOINKEYS FILE=F2, FIELDS=(1,10,A), TYPE=F, LRECL=70, BLKSIZE=700 CUSTOMER NUMBER
REFORMAT FIELDS=(F2:1,67, NAME/ADDRESS RECORD
      F1:25,6) DATE OF PURCHASE
SORT FIELDS=(1,10,BI,A), EQUALS
SUM FIELDS=NONE LEAVE ONLY LAST PURCHASE
OUTFIL HEADER2=(28:'C U S T O M E R   L I S T',/,/,
      30:'LAST PURCHASE IN 2003',/,/,
      2:'NAME',
      26:'STREET ADDRESS',
      52:'CITY',
      68:'ST',
      75:'DATE',/),
INCLUDE=(68,6,Y2T,LT,Y'040101'),
OUTREC=(2:11,20, NAME
      26:31,20, STREET ADDRESS
      52:51,15, CITY
      68:66,2, STATE
      73:70,2,C'/', MM OF LAST PURCHASE
      72,2,C'/', DD OF LAST PURCHASE
      68,2) YY OF LAST PURCHASE

```

Output

C U S T O M E R L I S T				
LAST PURCHASE IN 2003				
NAME	STREET ADDRESS	CITY	ST	DATE
GEORGE STORMS	9 EAST FIRST AVE	TUCKERVILLE	NM	10/11/03
ARTHUR HOFFMAN	25 BROOKSIDE DRIVE	BRANDT	SD	04/21/03
GREG DAVIS	9 MOUNTAIN AVE	NORTH RIVER	AL	05/12/03
MARY FELDER	27 LAKEVIEW DRIVE	LAVA	FL	12/31/03
JUDY MAZUR	12 WINDING CREEK RD	NEWTON	CA	12/31/03
MEGAN MADRUS	136 PARK PLACE	GRAND ISLAND	WI	09/29/03

Example 2

Joining Two Variable-Length Files That Have Variable Portions Required in the Output

Problem

A university keeps a master file containing information pertaining to the classes that each student took. The first part of each record contains student information including a student ID number. The length of this section is fixed. Following this is a variable number of fixed-length sections that contain information on each class taken prior to the latest completed semester. There is a second file that has similar data but is limited to information about only the latest completed semester. After the semester has completed, the information from the second file (exclusively the latest completed semester) must be merged into the first file (master file).

Input File 1: Student History File (Master File)

(TYPE=V,LRECL=80,BLKSIZE=8000)

Position	Length	Description
1	4	RDW (RECFM=VB)
5	8	Student ID Number
13	3	Semester
16	1	Grade
17	5	Class ID
22	1	filler

Repeat 13,10 for each class.

	1	2	3	4	5	6	7
1	----	----	----	----	----	----	----
	0	0	0	0	0	0	0...
....	07092832304C43211	304A44321	104B67321				
....	07099932202C32100						
....	07113874103A78831	204A87123	204A89321				
....	07118948304C84122	304B87123	304A71653	304A21121			
....	07128317202C78831	303B12118	104A84122	304B87123	304A81001		
....	07129746201A89321	202A21221	304A43211				
....	07143213304B77631	304C78831	304A87123	104C84122	304A71653		
....	07143321201B44321	102A87123					
....	07162313103A84122						
....	07187655402B12091	103A21121					
....	07191233303A71653	303A87123	104B11982	304A76653			
....	07194328402B43211	402A76653					
....	07195439303C87781	104A81001	204A76653	204A97123			
....	07196323302B87123	103C89321	204A78311	104B43211			
....	07200010302D67321	402C87123	304B43781				
....	07217301103A87123	203B23112					
....	07221284204B23112	204A73213	304A71653				
....	07224126304C84122	304B65531	104C87123				
....	07314229301C71653	104A87123	304B32100	304C23112	304A78831		
....	07432177204D73213	204C87123	304C89321				

Input File 2: Latest Completed Semester Information File

File 2 has the same layout as File 1 but contains information about the latest completed semester only.

	1	2	3	4	5	6	7
1	----	----	----	----	----	----	----
	0	0	0	0	0	0	0...
....	07196323105A32981	105B78831					
....	07129746105A87123						
....	07113874105A23213	105A99911	105B32123				
....	07092832105B54321	105B65531					
....	07143213105C32212	105A21121					
....	07194328105B87123						
....	07217301105A67321	105B43211	105B21121				
....	07314229105C21121	105D43321					
....	07162313105A87123						
....	07118948105B12188	105A65431					

Approach

JOINKEYS	Specifies the location of the join field (student ID number) for each file. The SORTED parameter indicates that the records from a given input file are already in the join key sequence. This will improve the application's performance.
JOIN	Requests that joined records (for students who took classes this semester) and unpaired records from file 1 (for students who have taken classes in the past but not during the past semester) are included in the sort.
REFORMAT	Defines the record layout to be produced by the join processing. Since the records will be variable-length, an RDW is required. The variable-length section is defined by specifying a position without a length. One can be specified from each file; in this case, one is specified from both. The variable-length section(s) must be at the end of the REFORMATed record.
SORT	Specifies SORT FIELDS=COPY since the records coming out of the JOIN process are already in the desired sequence.

Control Statements

```
JOINKEYS FILE=F1, FIELDS=(5, 8, A), SORTED, TYPE=V, LRECL=80, BLKSIZE=8000
JOINKEYS FILE=F2, FIELDS=(5, 8, A), TYPE=V, LRECL=80, BLKSIZE=8000
JOIN UNPAIRED, F1
REFORMAT FIELDS=(F1:1, 4,          RDW
                  F1:5, 8,          STUDENT ID NUMBER
                  F1:13,           HISTORY OF CLASSES
                  F2:13)           PREVIOUS SEMESTER'S CLASSES
SORT FIELDS=COPY
```


Output

```
....07092832304C43211 304A44321 104B67321 105B54321 105B65531
....07099932202C32100
....07113874103A78831 204A87123 204A89321 105A23213 105A99911 105B32123
....07118948304C84122 304B87123 304A71653 304A21121 105B12188 105A65431
....07128317202C78831 303B12118 104A84122 304B87123 304A81001
....07129746201A89321 202A21221 304A43211 105A87123
....07143213304B77631 304C78831 304A87123 104C84122 304A71653 105C32212 105A21121
....07143321201B44321 102A87123
....07162313103A84122 105A87123
....07187655402B12091 103A21121
....07191233303A71653 303A87123 104B11982 304A76653
....07194328402B43211 402A76653 105B87123
....07195439303C87781 104A81001 204A76653 204A97123
....07196323302B87123 103C89321 204A78311 104B43211 105A32981 105B78831
....07200010302D67321 402C87123 304B43781
....07217301103A87123 203B23112 105A67321 105B43211 105B21121
....07221284204B23112 204A73213 304A71653
....07224126304C84122 304B65531 104C87123
....07314229301C71653 104A87123 304B32100 304C23112 304A78831 105C21121 105D43321
....07432177204D73213 204C87123 304C89321
```

Example 3

Join Application That Isolates the Unpaired Records from One of the Input Files

Problem

A real estate agency maintains a list of properties that are currently on the market. The lists are updated each month. The agency wants to produce a list of all properties that were on the market last month but are no longer on the market. This can be accomplished by comparing the new list against the previous month's list. The "No Longer Available" list should be ordered by state and city.

Input File 1: Properties for Sale (Current)

(TYPE=F,LRECL=70,BLKSIZE=700)

Position	Length	Description
1	10	Property Number
11	20	Street Address
31	20	City
51	2	State
53	1	filler
54	17	Agent

1	2	3	4	5	6	7
1029384756126	GERARD AVE	RIDGEFIELD PARK	CT	GARY MIDDLE		
2938475610454	MAIN ST	OAKWOOD	NJ	BILL WARWIK		
837465019211	PLYMOUTH DR	HACKENSACK	NJ	LISA KAGE		
7465019283220	BANK ST	SUTTON	NY	RUSSELL GEETER		
65019283744	NAVAJO PL	LINCOLN PARK	CT	ROBYN FERLOPEZ		
1234509876706	BELMONT RD	GREENVIEW	MD	KEN WILLIAMS		
098761234577	MAHWAH CIRCLE	HARRISON	NJ	PAT SEEGALL		
5432167890866	MCCOY RD	FRANKLIN	CT	DON POLO		
6789054321134	RICHARDS RD	CHESTNUT	PA	MIKE STUART		
1357924680832	ARDSLEY CT	HUDSON	DE	BETTY MCNIGHT		
2468013579224	WARREN BLVD	HICKORY HILL	NY	SAM DEON		
09128734565104	DEER TRAIL	LACKAWANNA	NY	ANNE JACKSON		

Input File 2: Properties for Sale (Previous Month)

(Layout is the same as File 1.)

1	2	3	4	5	6	7
1029384756126	GERARD AVE	RIDGEFIELD PARK	CT	GARY MIDDLE		
195623487179	VITMAR PL	VOORHEES	NJ	ALICE BAKEN		
837465019211	PLYMOUTH DR	HACKENSACK	NJ	LISA KAGE		
7465019283220	BANK ST	SUTTON	NY	RUSSELL GEETER		
1234509876706	BELMONT RD	GREENVIEW	MD	KEN WILLIAMS		
4587872225243	PERRY LANE	MAPLE GROVE	CT	BILL JERREMEY		
5432167890866	MCCOY RD	FRANKLIN	CT	DON POLO		
6789054321134	RICHARDS RD	CHESTNUT	PA	MIKE STUART		
323254578959	VIRGINIA AVE	CIDER HILL	NJ	KEVIN DAYMON		
11112558454	ALBERON TERR	GOFFLE	NY	GEORGE CHAINS		
2468013579224	WARREN BLVD	HICKORY HILL	NY	SAM DEON		
9589656562321	WEST END	FLETCHER	DE	ED BANKS		
09128734565104	DEER TRAIL	LACKAWANNA	NY	ANNE JACKSON		

Approach

- JOINKEYS** Specifies the location of the join field (Property Number) for each file.
- JOIN** Requests only those records that appear in last month's list but not this month.
- SORT** Specifies the sort keys and order (state and city, ascending).

Note: The REFORMAT statement is not required since the only records that are included are from F2. The record layout in this case will be identical to file F2.

Control Statements

```
JOINKEYS FILE=F1, FIELDS=(1,10,A), TYPE=F, LRECL=70, BLKSIZE=700
JOINKEYS FILE=F2, FIELDS=(1,10,A), TYPE=F, LRECL=70, BLKSIZE=700
JOIN UNPAIRED, ONLY, F2
*
SORT FIELDS=(51,2,CH,A,31,20,CH,A), EQUALS
```

```
PROPERTY NUMBER
PROPERTY NUMBER
SAVE ONLY UNMATCHED
FROM FILE 2
STATE AND CITY
```

Output

4587872225243	PERRY LANE	MAPLE GROVE	CT BILL JERREMEY
9589656562321	WEST END	FLETCHER	DE ED BANKS
323254578959	VIRGINIA AVE	CIDER HILL	NJ KEVIN DAYMON
11112558454	ALBERON TERR	GOFFLE	NY GEORGE CHAINS
195623487179	VITMAR PL	VOORHEES	NJ ALICE BAKEN

Example 4

Join Fixed-Length and Variable-Length Records with Record Selection

Problem

A repair service needs to see a list of completed service calls in which the total cost of the replacement parts used was at least \$1,000. The first file contains information related to the customer, the service rendered, and the repairman. The second file contains a record of the parts used in each service call.

Input File 1: Service Request Information

(TYPE=F,LRECL=80,BLKSIZE=2400)

Position	Length	Description
1	6	Customer ID number
7	6	Date Opened
13	6	Service Request ID
19	2	Status
21	2	Next Action
23	20	Engineer
43	4	Product ID
47	1	Severity
48	20	Description
68	6	Date Closed
74	6	Date of Last Service
80	1	filler


```

          1          2          3          4          5          6          7
1----+----0----+----0----+----0----+----0----+----0----+----0----+----0...
....3983210000108289873100043954783200059923933100004412
....3998930000163665009200120454321100043211
....3999420000101967562100054023883100040132874100007812
....4002110000119267733100019843634200004412674200095012
....4013760000140924902300060912839200080012
....4018760000102317832100001453300300043243893100057621
....4019810000017523221000012111983100005412
....4019990000088866154300088530123200000131
....4023890000112819640100002788883100087832878800022199
....404021000023734313200022521983200001213
....4072970000037354430100036042490200001312
....4122110000133818783100041243322100012043743100080532
....4221900000001200734200001200
....4231230000108478012300076343874300032135
....4239110000128435583200123242339300002042731200003151
....4300020000107710321100084321102900003212003000020177
....4340310000089374533200034232943100055132
....4345990000106473821200074342421300032131
....4356210000034442323900034442
....4391990000090174032100034642747100055532

```

Approach

- JOINKEYS** Specifies the location of the join field (service request ID) for each file. Limits the service call records to only those that are CLOSED and to those in which the price of parts is at least \$1000. Since the records in file 2 are already in the join key sequence, the SORTED parameter can be used to improve the performance of the application.
- REFORMAT** Defines the record layout to be produced by the join processing. Since the resulting records will be variable-length, an RDW is required.
- SORT** Specifies the sort key and order (customer ID number, ascending).

Control Statements

```
JOINKEYS FILE=F1, FIELDS=(13,6,A), TYPE=F, LRECL=80, BLKSIZE=2400, SERVICE REQUEST ID
INCLUDE=(19,2,CH,EQ,C' C') INCLUDE ONLY CLOSED TICKETS
JOINKEYS FILE=F2, FIELDS=(5,6,A), TYPE=V, LRECL=200, BLKSIZE=1700, SERVICE REQUEST ID
SORTED, IMPROVE PERFORMANCE
INCLUDE=(11,10,ZD,GE,100000) INCLUDE ONLY >= $1000.00
REFORMAT FIELDS=(F2:1,4, RDW
F1:1,6, CUSTOMER ID NUMBER
F2:5,6, SERVICE REQUEST ID
F1:74,6, DATE OF LAST SERVICE
F2:11,10, TOTAL COST OF PARTS
F1:23,20, ENGINEER
F2:21) PART #/COST (1 PER ENTRY)
SORT FIELDS=(5,6,BI,A), EQUALS
OUTFIL BLKSIZE=1700
```

Output

....0009324018760305050000102317PAUL KRAUS	832100001453300300043243893100057621
....0023114122110307050000133818BETTY HAUN	783100041243322100012043743100080532
....0067433998930305050000163665SARAH YACA	009200120454321100043211
....0076784013760301050000140924KAREN GORGE	902300060912839200080012
....0076784345990305050000106473KAREN GORGE	821200074342421300032131
....0093413983210228050000108289SARAH YACA	873100043954783200059923933100004412
....0121124231230302050000108478KARL MASTERS	012300076343874300032135
....0212414023890306050000112819DOUG BELKIN	640100002788883100087832878800022199

Example 5

Join One Record to Many Records

Problem

A pre-owned auto dealership would like to produce a file that contains information on vehicles sold by each salesperson along with pricing and the commissions earned. The data needed to produce this file are located in two separate files. The first file contains information about the sales force, including their rates of commission. The second file contains information about both sold and unsold vehicles.

Input File 1: Sales Force Information

(TYPE=F,LRECL=50,BLKSIZE=5000)

Position	Length	Description
1	9	filler
10	10	Salesperson ID
20	5	filler
25	20	Salesperson Name
45	4	Commission Rate
49	2	filler

1	2	3	4	5						
1	---	0	---	0	---	0	---	0	---	0
	3245312112	PHIL GOLD		0125						
	8372138841	RONALD SETZLER		0110						
	5647243652	GLORIA KETMAR		0145						
	7734823131	PAT LASAN		0120						

Input File 2: Vehicle Inventory

(TYPE=F,LRECL=60,BLKSIZE=6000)

Position	Length	Description
1	17	VIN
18	1	filler
19	12	Model
31	10	Salesperson ID
41	1	filler
42	5	Asking Price
47	1	filler
48	5	Selling Price
53	1	filler
54	6	Transaction Date
60	1	filler

1	2	3	4	5	6
1-----0-----+-----0-----+-----0-----+-----0-----+-----0-----+-----0					
78432GH3134234203	PACER		01500	00000	
17482SD7849276431	EXPLORER	5647243652	22750	21000	030105
89437AE7892864213	CORNET		00750	00000	
98877NI0900133412	MUSTANG	7734823131	27800	25000	020905
23429KO9442104877	IMPALA		25400	00000	
89842YR4265542513	TERCEL	3245312112	06500	06100	022805
88942LK8742136424	RANGER	8372138841	04999	04000	030205
43374ZS9842413475	SABLE	5647243652	05400	05100	021105
89813DE8332334321	F150		10499	00000	
56511KL8742430138	DURANGO	7734823131	12400	11450	022105
88492AQ7847646211	TARUS		04500	00000	
76472AE4594449234	STRATUS	5647243652	03499	03250	021505
91734XC8448155121	CARAVAN	7734823131	06250	06100	020805
76231JP5680584525	SPIRIT		00999	00000	
42193WR9898411254	WINSTAR	5647243652	00500	00500	022505
89423XM8546231345	CAMARO	7734823131	10100	10000	022005
55423IM4857592241	SUBURBAN	3245312112	23900	23500	021305
88429WQ5432187429	COBRA	5647243652	03250	03000	030305
89421VD6789872321	JETTA		05499	00000	
88741KJ7492013178	ACCORD	8372138841	08000	07500	030205

Approach

JOINKEYS	Specifies the location of the join field (salesperson ID) for each file.
REFORMAT	Defines the record layout to be produced by the join processing.
SORT	Specifies the sort keys and orders (salesperson ID, ascending; VIN, ascending).
OUTREC	Copies the input record and calculates the commission.

Note: The salesperson ID for unsold vehicles will contain spaces instead of a number.

Control Statements

```
JOINKEYS FILE=F1, FIELDS=(10,10,A), TYPE=F, LRECL=50, BLKSIZE=5000 SALESPERSON ID
JOINKEYS FILE=F2, FIELDS=(31,10,A), TYPE=F, LRECL=60, BLKSIZE=6000 SALESPERSON ID
REFORMAT FIELDS=(F2:31,10, SALESPERSON ID
                F2:1,17, VIN
                F1:25,20, SALESPERSON NAME
                F2:48,5, SELLING PRICE
                F1:49,1, FILLER
                F1:45,4, COMMISSION RATE
                F2:19,12) MODEL
SORT FIELDS=(1,10,CH,A,11,17,CH,A) SALESPERSON ID AND VIN
OUTREC FIELDS=(1,69, COPY ENTIRE RECORD
                (48,5,ZD,MUL,54,4,ZD),DIV, CALCULATE COMMISSION
                +1000,EDIT=(TTTTT),LENGTH=5) CALCULATE COMMISSION
```

Output

324531211255423IM4857592241PHIL GOLD	23500	0125SUBURBAN	02937
324531211289842YR4265542513PHIL GOLD	06100	0125TERCEL	00762
564724365217482SD7849276431GLORIA KETMAR	21000	0145EXPLORER	03045
564724365242193WR9898411254GLORIA KETMAR	00500	0145WINSTAR	00072
564724365243374ZS9842413475GLORIA KETMAR	05100	0145SABLE	00739
564724365276472AE4594449234GLORIA KETMAR	03250	0145STRATUS	00471
564724365288429WQ5432187429GLORIA KETMAR	03000	0145COBRA	00435
773482313156511KL8742430138PAT LASAN	11450	0120DURANGO	01374
773482313189423XM8546231345PAT LASAN	10000	0120CAMARO	01200
773482313191734XC8448155121PAT LASAN	06100	0120CARAVAN	00732
773482313198877NI0900133412PAT LASAN	25000	0120MUSTANG	03000
837213884188741KJ7492013178RONALD SETZLER	07500	0110ACCORD	00825
837213884188942LK8742136424RONALD SETZLER	04000	0110RANGER	00440

Example 6

Join Multiple Records from the First File to Multiple Records from the Second File

Problem

A support organization keeps track of all problems reported by their customers. At the end of the month, each member of the support team is notified of all open, critical problems for any customer that is supported by their group, regardless of which member of the support team is handling the problem.

Input File 1: Analyst Information

(TYPE=F,LRECL=40,BLKSIZE=8000)

Position	Length	Description
1	20	Analyst Name
21	5	Analyst ID Number
26	5	filler
31	5	Group ID Number
36	5	filler

1	2	3	4
1-----0-----0-----0-----0			
PAUL BUCK	00213	12032	
ROSE HOSTERM	00110	39111	
BILL LABAR	00331	12032	
SHARON MERWIN	00087	12032	
ROBERT PARK	00173	39111	

Input File 2: Customer Information

(TYPE=F,LRECL=70,BLKSIZE=1400)

Position	Length	Description
1	8	Problem Tracking Number
9	1	filler
10	20	Customer Name
30	10	filler
40	5	Analyst ID Number
45	5	Group ID Number
50	1	filler
51	1	Severity of Problem
52	1	Status
53	1	filler
54	6	Date Opened
60	6	Date Closed
66	5	filler

	1	2	3	4	5	6	7
1	----	0----	0----	0----	0----	0----	0----
43023701	AROUND TOWN CYCLE			0033112032	10	022705	
43023702	MUSCLE MAX GYM			0008712032	20	022805	
43023703	FOX CLOCK REPAIR			0017733911	1C	030105030405	
43023704	TJ AUTO REPAIR & TOW			0011039111	10	030105	
43023705	GREEN FIELDS NURSERY			0008712032	20	030105	
43023706	1ST PLACE TROPHY			0011039111	30	030205	
43023707	ALPINE FINE FOODS			0017739111	10	030205	
43023708	SPEEDY DELIVERY			0033112032	20	030305	
43023709	HNG WASTE DISPOSAL			0021312032	10	030305	
43023710	BARROW UPHOLSTERY			0011039111	3C	030305030605	
43023711	AMERICAN RENTALS			0033112032	20	030305	
43023712	EXPERIENCED TRAVELER			0021312032	1C	030405030505	
43023713	MAJESTIC TATTOO			0017739111	10	030405	
43023714	BRANDT TRUCKING			0017739111	10	030505	
43023715	DECKER FINANCIAL			0021312032	20	030505	
43023716	MR. ELECTRIC			0011039111	10	030505	
43023717	THE PET PLACE			0008712032	20	030505	
43023718	CAPITAL IRON WORKS			0033112032	10	030505	
43023719	SPARTA TILE			0008712032	1C	030605030805	
43023720	AFFORDABLE USED CARS			0021312032	30	030605	

Approach

JOINKEYS	Specifies the location of the join field (group ID number) for each file and only includes those problems that are still OPEN and are assigned severity 1.
REFORMAT	Defines the record layout to be produced by the join processing.
SORT	Specifies the sort keys and order (group ID number and analyst ID number, ascending).
OUTREC	Converts the group ID number to the group name.
OUTFIL	Creates a report with sections devoted to each group.

Control Statements

```
JOINKEYS FILE=F1, FIELDS=(31,5,A), TYPE=F, LRECL=40, BLKSIZE=8000      GROUP ID NUMBER
JOINKEYS FILE=F2, FIELDS=(45,5,A), TYPE=F, LRECL=70, BLKSIZE=1400,    GROUP ID NUMBER
    INCLUDE=(51,1,CH,EQ,C'1',AND,                                       SEVERITY
              52,1,CH,EQ,C'O')                                           STATUS
REFORMAT FIELDS=(F1:1,20,                                              ANALYST NAME
                 F2:45,5,                                              GROUP ID NUMBER
                 F2:10,20,                                             CUSTOMER NAME
                 F2:1,8)                                               PROBLEM TRACKING NUMBER
SORT FIELDS=(21,5,CH,A,1,20,CH,A), EQUALS                               GROUP ID NUMBER & ANALYST
OUTREC FIELDS=(1,53,                                                  COPY ENTIRE RECORD
              21,5,CHANGE=(5,C'12032',C'NORTH',                       ADD GROUP NAME
                          C'39111',C'SOUTH'))
OUTFIL SECTIONS=(21,5,SKIP=P,                                         EACH GROUP ON SEPARATE PAGE
                HEADER3=(2:C'OPEN CRITICAL PROBLEMS FOR: ',          GROUP NAME
                        54,5,/,
                        1:C'CUSTOMER NAME',
                        25:C'PROB #',
                        35:C'ANALYST'),
                TRAILER3=(/,5:C'TOTAL CRITICAL OPENS: ',             ADD TOTALS FOR GROUP
                        COUNT)),
                OUTREC=(1:26,20,                                       CUSTOMER NAME
                       25:46,8,                                         PROBLEM TRACKING NUMBER
                       35:1,20)                                          ANALYST
```

Output

OPEN CRITICAL PROBLEMS FOR: NORTH

CUSTOMER NAME	PROB #	ANALYST
AROUND TOWN CYCLE	43023701	BILL LABAR
HNG WASTE DISPOSAL	43023709	BILL LABAR
CAPITAL IRON WORKS	43023718	BILL LABAR
AROUND TOWN CYCLE	43023701	PAUL BUCK
HNG WASTE DISPOSAL	43023709	PAUL BUCK
CAPITAL IRON WORKS	43023718	PAUL BUCK
AROUND TOWN CYCLE	43023701	SHARON MERWIN
HNG WASTE DISPOSAL	43023709	SHARON MERWIN
CAPITAL IRON WORKS	43023718	SHARON MERWIN

TOTAL CRITICAL OPENS: 9

OPEN CRITICAL PROBLEMS FOR: SOUTH

CUSTOMER NAME	PROB #	ANALYST
TJ AUTO REPAIR & TOW	43023704	ROBERT PARK
ALPINE FINE FOODS	43023707	ROBERT PARK
MAJESTIC TATTOO	43023713	ROBERT PARK
BRANDT TRUCKING	43023714	ROBERT PARK
MR. ELECTRIC	43023716	ROBERT PARK
TJ AUTO REPAIR & TOW	43023704	ROSE HOSTERM
ALPINE FINE FOODS	43023707	ROSE HOSTERM
MAJESTIC TATTOO	43023713	ROSE HOSTERM
BRANDT TRUCKING	43023714	ROSE HOSTERM
MR. ELECTRIC	43023716	ROSE HOSTERM

TOTAL CRITICAL OPENS: 10

Example 7

Complex Join That Identifies Additions, Deletions, and Updates to a Master File

Problem

A master file with records containing unique ID numbers is updated during the month. At the beginning of each month, a list is requested that will detail the changes to the file from the previous month. One section should contain a list of the records that were deleted, a second should contain the records that were added, and the last should contain those that were updated. The two files used in this project are copies of the same file. The first file is the current Customer Information File. The second file is a copy of this file as it was at the beginning of the previous month.

Input File 1: Current Customer Information File

(TYPE=F,LRECL=40,BLKSIZE=4000)

Position	Length	Description
1	24	Company Name
25	5	ID Number
30	1	filler
31	5	Address ID
36	5	filler

	1	2	3	4
1-----0-----0-----0-----0-----0				
SMITH'S THRIFT SHOPPE	39417	00100		
JONES' DAIRY AND DELI	23217	00120		
DAVIS' BAGEL SHOPS	51313	00110		
MURPHY'S BAR AND PUB	43351	00500		
THE COUNTRY STORE	13290	00340		
ENGRAVINGS R' US	43212	01230		
STEVE'S DELICATESSEN	32343	00810		
JOHN'S ARMY SURPLUS	00689	02345		
WOODCLIFF MOTEL	11111	09340		
MONTYS HARDWARE	64234	00990		
AMAZING JOE'S TOWING	11991	02504		
THE EURO STORE	32006	01120		
PC REPAIR	00932	00322		
OLDE TIME PHOTOGRAPHY	22212	00933		
MAGIC FINGERS MASSAGE	74832	01003		
ON-THE-LAKE FINE DINING	54329	00121		
CRITTERS AND FEATHERS	23731	03321		
A1 DRY CLEANERS	77454	05543		
SPOTLESS AUTO WASH	82187	00321		
BOOK-NOOK BOOKSTORE	32221	00433		

Input File 2: Previous Month's Customer Information File (Layout the Same as File 1)

	1	2	3	4
1-----0-----0-----0-----0-----0				
JOHN'S ARMY SURPLUS	00689	02345		
JONES' DAIRY AND DELI	23217	00120		
THE DOLLAR STORE	32006	01120		
TOWER MASONRY	00321	00322		
VALLEY PAVING	64214	00488		
PC REPAIR	00932	00322		
THE COUNTRY STORE	13290	87432		
SMITH'S THRIFT SHOPPE	39417	83213		
DAVIS' BAGEL SHOPS	51313	00110		
ON-THE-LAKE FINE DINING	54329	00121		
A1 DRY CLEANERS	77454	32981		
SPOTLESS AUTO WASH	82187	00321		
MAGIC FINGERS MASSAGE	74832	01003		
AMAZING JOE'S TOWING	11991	02504		
BOOK-NOOK BOOKSTORE	32221	00433		
HIGHLAND GLASS	32871	01033		
ALL COUNTY MEDICAL	87321	00001		
ENGRAVINGS R' US	43212	32134		
WOODCLIFF MOTEL	11111	09340		
ABC PLUMBING	78321	00737		

Approach

JOINKEYS	Specifies the ID number for each file.
JOIN	UNPAIRED causes the matched and unmatched records to be included in the sort.
REFORMAT	Defines the record layout to be produced by the join processing.
SORT	FIELDS=COPY is used since the records will be in ID number order from the JOIN processing.
OUTFIL	Creates one file that contains the modified records, one that contains the added records, and one that contains the deleted records. If a record has been added to the master file, it will appear only in file 1 (the second half of the reformatted record is X'FF', and the first half contains data). If a record is modified, it will appear in both file 1 and file 2 (both halves of the record contain data). If a record was deleted, it will appear only in file 2 (the first half of the reformatted record will contain X'FF', while the second half contains data).

Control Statements

```
JOINKEYS FILE=F1,FIELDS=(25,5,A),TYPE=F,LRECL=40,BLKSIZE=4000
JOINKEYS FILE=F2,FIELDS=(25,5,A),TYPE=F,LRECL=40,BLKSIZE=4000
JOIN UNPAIRED
REFORMAT FIELDS=(F1:1,40,F2:1,40),FILL=X'FF'
OMIT COND=(1,40,CH,EQ,41,40,CH) FILTER OUT EQUAL RECORDS
SORT FIELDS=COPY,FILESOUT=3,EQUALS
OUTFIL FILES=01, DELETED RECORDS
    INCLUDE=(1,1,BI,EQ,X'FF'),
    OUTREC=(1:65,5,7:41,24,32:71,5,55:C' '),
    HEADER2=(10:' DELETED RECORDS',/,
    1:'ID',
    7:'COMPANY NAME',
    32:'ADR ID')
OUTFIL FILES=02, ADDED RECORDS
    INCLUDE=(41,1,BI,EQ,X'FF'),
    OUTREC=(1:25,5,7:1,24,32:31,5,55:C' '),
    HEADER2=(11:' ADDED RECORDS',/,
    1:'ID',
    7:'COMPANY NAME',
    32:'ADR ID')
OUTFIL FILES=03,SAVE, UPDATED RECORDS
    OUTREC=(1:25,5,7:1,24,32:31,5,43:41,24,71:71,5),
    HEADER2=(35:'UPDATED RECORDS',/,
    1:'ID',
    7:'NEW NAME',
    32:'NEW ADR',
    43:'OLD NAME',
    69:'OLD ADR')
END
```

Output

DELETED RECORDS				
ID	COMPANY NAME	ADR ID		
00321	TOWER MASONRY	00322		
32871	HIGHLAND GLASS	01033		
64214	VALLEY PAVING	00488		
78321	ABC PLUMBING	00737		
87321	ALL COUNTY MEDICAL	00001		

ADDED RECORDS				
ID	COMPANY NAME	ADR ID		
22212	OLDE TIME PHOTOGRAPHY	00933		
23731	CRITTERS AND FEATHERS	03321		
32343	STEVE'S DELICATESSEN	00810		
43351	MURPHY'S BAR AND PUB	00500		
64234	MONTYS HARDWARE	00990		

UPDATED RECORDS				
ID	NEW NAME	NEW ADR	OLD NAME	OLD ADR
13290	THE COUNTRY STORE	00340	THE COUNTRY STORE	87432
32006	THE EURO STORE	01120	THE DOLLAR STORE	01120
39417	SMITH'S THRIFT SHOPPE	00100	SMITH'S THRIFT SHOPPE	83213
43212	ENGRAVINGS R' US	01230	ENGRAVINGS R' US	32134
77454	A1 DRY CLEANERS	05543	A1 DRY CLEANERS	32981

