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Fifty Ways to Lose Your Data (and How to Avoid Them)

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ABSTRACT

There probably are not 50 ways to lose your data, but there are a bunch. Of course, if we all backed up our data before working with it, there wouldn't be a problem. However, that's not always a practical solution, especially if your data sets are large. By being aware of coding syntax that can lead to data destruction, you can avoid finding yourself with a data set containing 0 observations. The techniques in this paper can help anyone from the novice to the experienced user prevent disasters. If you've never had this problem, these techniques will allow you to continue to be quite proud of yourself.

INTRODUCTION

As a programmer, you know how important it is to review your program before you submit it, especially if you are manipulating an existing data set. In addition to destroying an entire data set, there are many logic errors, syntax errors, and even human errors that destroy data integrity. This paper groups possible destructive techniques and their solutions into the following categories:

- Novice problems
- Not knowing your data
- Syntax errors
- Bad logic
- Intentionally deleting data sets
- Hardware problems

NOVICE PROBLEMS

Many errors that beginning SAS® programmers encounter fall into other categories; however, three are identified as common misconceptions.

1. Assuming data must be created before it can be used.

```
data perm.DataSet;
proc print data = perm.DataSet;
run;
```

Solution: Refer to the permanent data set in the PRINT procedure. It is not necessary to have a DATA step in order to use a data set name in the PROC statement.

```
proc print data = perm.DataSet;
run;
```

2. Not keeping all of the variables that you want to keep.

```
data NewData;
   set OldData;    /*The data set OldData contains the variables X, Y, and Z. */
   keep Z;         /*The only variables kept should be the variables W and Z. */
   W = X + Y;
run;
```

Solution: Specify all of the variables you want to keep (even new ones that are created in the DATA step) in the KEEP statement.

```
data NewData;
   set OldData;
   keep Z W;
   W = X + Y;
run;
```

3. **Not knowing the names of your permanent data sets and creating a new one with the name of an existing data set.**

```
data perm.old_data;
   set other_data;
   if x = . then x = 5;
run;
```

Solution: Look at the names of the existing permanent data sets before creating a new one.

```
proc datasets lib = perm nods;
   contents data = _all_;
run;

data perm.new_name;
   set other_data;
   if x = . then x = 5;
run;
```

NOT KNOWING YOUR DATA

The first rule of programming should be 'know thy data.' Unfortunately, many programmers rush into their programming tasks without considering the values of their data. The following are examples of ignoring that rule.

4. **Not knowing the case of character data.**

```
data you;
   set perm.Names;
   where FirstName contains 'il';
run;
```

Solution: Use the UPCASE function when comparing character variables with constants.

```
data you;
   set perm.Names;
   where UPCASE(FirstName) contains 'IL';
run;
```

5. **Incorrectly choosing the length of numeric data.**

```
data five;
   length num5 5 num8 8;
   do num8 = 10000000000 to 10000000000000 by 100000000000;
      num5 = num8;
      output;
   end;
run;
```

Here are the observations six through eight in the data set FIVE. Notice that the values of NUM5 and NUM8 are not equal starting with observation seven, even though the assignment statement NUM5=NUM8 makes them equal.

```
Obs              num5                 num8

6         510000000000         510000000000
7         609999998976         610000000000
8         709999998976         710000000000
```

Solution: Do not change the length of numeric data if the values are large numbers.

```
data five;
   do num8 = 10000000000 to 10000000000000 by 100000000000;
      num5 = num8;
      output;
   end;
run;
```

6. **Incorrectly determining the length of character data.**

trainer.dat

```
Linda Jolley, Technical Trainer
Jane Stroupe, Technical Trainer
```

```
data instructor;
   infile 'trainer.dat' dlm = ',';
   input Name $ Job;
run;
```

The resulting data follows:

```
Name            Job
Linda Jo     Technica
Jane Str     Technica
```

Solution: When using list input, specify the length of the character data. List input is used to read this data since it is free format data. The default length of character data is 8, which can sometimes result in data truncation.

```
data instructor;
   length Name $ 12 Job $ 17;
   infile 'trainer.dat' dlm = ',';
   input A $ B $;
run;
```

Alternate Solution: Use the colon modifier to specify an informat in the INPUT statement.

```
data instructor;
   infile datalines dlm = ',';
   input Name : $12. Job : $17.;
run;
```

7. **Having large numeric data that results in precision problems.**

```
data BigNumber_Num;
   input Num;
datalines;
12345678901234567890
;
run;
```

Numeric data can store 16 or 17 significant digits in a length of 8; therefore, if a numeric value has more than 16 or 17 digits, you lose precision. The resulting value of NUM in this example is `12345678901234567168`.

Solution: Create a character value instead of a numeric value. The value of this character variable would be `12345678901234567890`.

```
data BigNumber_Char;
   input Num : $20.;
datalines;
12345678901234567890
;
run;
```

8. **Creating a numeric variable from a character variable.**

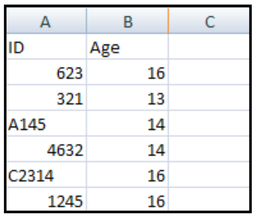
```
data Try_Again;
   set BigNumber_Char;
   NewNum = input(Num, 20.);
   format NewNum 20.;
run;
```

Solution: The problem continues to be the length of the original number. Even if you create a character value instead of a numeric one for the variable NUM and then attempt to use the INPUT function to create a numeric variable from the character value, you lose precision.

9. **Using PROC IMPORT to determine the type of variable.**

```
proc import out = work.teens datafile = "teens.xls"
            dbms = excel replace;
run;
```

The Excel spreadsheet:



A	B	C
ID	Age	
623	16	
321	13	
A145	14	
4632	14	
C2314	16	
1245	16	

Solution: Use the MIXED=YES option in the PROC IMPORT statement. The MIXED=YES option assigns a SAS character type for the column and converts all numeric data values to character data values when mixed data types are found.

```
proc import out = work.teens
            datafile = "teens.xls"
            dbms = excel replace;
   mixed=yes;
run;
```

10. **Having raw data with long record lengths.**

```
 data LongRecl;
   infile 'LongRec.dat';
   input Char $480.;
   Len = length(Char);
run;
```

Solution: Use the LRECL= option in the INFILE statement since the record length is longer than the default (256 bytes in Windows and UNIX).

```
data LongRecl;
   infile 'LongRec.dat' lrecl = 480;
   input Char $480.;
   Len = length(Char);
run;
```

11. **Not knowing that the raw data has varying lengths.**

numbers.dat

```
143
36921
2
4509
```

```
data varying;
   infile 'numbers.dat';
   input Num 6.;
run;
```

The result of the DATA step follows:

```
Obs      Num

 1      36921
 2       4509
```

Solution: See Number 12.

12. Not knowing that the raw data has varying lengths (Version 2).

```
data varying;
   infile 'numbers.dat' missover;
   input Num 6.;
run;
```

The result of the DATA step follows:

```
Obs     Num

 1       .
 2       .
 3       .
 4       .
```

Solution to both: Use the TRUNCOVER option in the INFILE statement.

```
data varying;
   infile 'numbers.dat' truncover;
   input Num 6.;
run;
```

The result of the DATA step follows:

```
Obs       Num

 1        143
 2      36921
 3          2
 4       4509
```

13. Having multiple delimiters treated as one delimiter.

fullnames.dat

```
Thomas, John Marshall
Sherrill, Franklin Woodford
```

```
data multiple;
   infile 'fullnames.dat' dlm = ', ';
   input LastName : $8. FirstMName : $25.;
run;
```

The result of this DATA step follows:

```
                    First
Obs     LastName    MName

 1      Thomas      John
 2      Sherrill    Franklin
```

Solution: Use the DLMSTR= option instead of the DLM= option in the INFILE statement. This SAS 9.2 option specifies that the delimiter must be the exact string. In this example, the delimiter must be a comma followed by a blank.

```
data multiple;
   infile 'fullnames.dat' dlmstr = ', ';
   input LastName : $8. FirstMName : $25.;
run;
```

The result of this DATA step follows:

```
Obs     LastName       FirstMName

 1      Thomas      John Marshall
 2      Sherrill    Franklin Woodford
```

14. Having class variables that are missing when creating statistics on an analysis variable.

```
proc summary data = perm.class nway;
   output out = summary mean = AvgAge;
   class Group;
   var Age;
run;
```

For most procedures that calculate statistics, missing CLASS variables are not included in the output data sets. The data used for this example is

```
Obs     Name          Age     Group

1     Michelle      15
2     Steve         15
3     James         12       A
4     Jeffrey       13       A
5     John          12       A
<rows removed>
20     Louise       12      D
21     Mary         15      D
```

The resulting data created by the SUMMARY procedure is as follows:

```
Obs     Group     _TYPE_     _FREQ_      AvgAge

1         A          1          4       12.0000
2         B          1          6       14.3333
3         C          1          1       11.0000
4         D          1          8       13.5000
```

Solution: Use the MISSING option in the PROC SUMMARY statement.

```
proc summary data = perm.class missing nway;
   output out = summary mean = AvgAge;
   class Group;
   var Age;
run;
```

The resulting data created by this SUMMARY procedure is as follows:

```
Obs     Group     _TYPE_     _FREQ_      AvgAge

1                    1          2       15.0000
2         A          1          4       12.0000
3         B          1          6       14.3333
4         C          1          1       11.0000
5         D          1          8       13.5000
```

SYNTAX ERRORS

Often syntax errors stop execution of a step; therefore, a DATA step might not remove data from your data set. However, there are some syntax errors that have a destructive behavior. Watch out for them!

15. Using the SQL procedure with too many semicolons.

```
proc sql;
   delete from test;
   where name='John';
quit;
```

Although this PROC SQL step causes a syntax error, it is too late. All of the rows of data have been deleted.

Solution: Put a semicolon only at the end of the SQL DELETE statement.

```
proc sql;
   delete from test
   where name='John';
quit;
```

Alternate Solution: Use the NOEXEC option in the PROC SQL statement. This option checks the syntax of a PROC SQL step without actually executing it.

```
proc sql noexec;
   delete from test
   where name='John';
quit;
```

16. Omitting a semicolon and misspelling a keyword.

```
data two
   ser perm.one;
run;
```

This program creates three data sets: TWO, SER, and PERM.ONE. Since there are no other statements in the DATA step, the data set PERM.ONE is created with no observations.

Solution: Add a semicolon at the end of the DATA statement and/or spell SET correctly. (The default SAS system option DATASTMTCHK = COREKEYWORDS prohibits the SET keyword as a one-level SAS data set name.)

```
data two;
   set perm.one;
run;

OR
```

```
data two
   set perm.one;
run;
```

17. Hitting the incorrect key on the keyboard causing more misspellings.

```
proc sql;
   delect * from perm.one;
quit;
```

Log

```
1171  proc sql;
1172     delect * from one;
         ------
         1
WARNING 1-322: Assuming the symbol DELETE was misspelled as delect.

NOTE: 3 rows were deleted from WORK.ONE.
1173  quit;
```

Solution: Watch your fingers as you type. SQL interprets DELECT as DELETE and deletes all the rows of data from the data set PERM.ONE. The 'S' and the 'D' are next to each other on a standard keyboard.

```
proc sql;
   select * from one;
quit;
```

18. Merging without a BY statement.

data set CHAR1

one	two
A	B
C	D
E	F

data set CHAR2

one	three
A	X
B	Y
C	Z

```
data char3;
   merge char1 char2;
run;
```

Without a BY statement, the merge combines the first observations of each data set, the second observations, and so forth. Therefore, there is incorrect data, and much of it is lost. This is the resulting data.

```
Obs    one    two    three

 1      A      B       X
 2      B      D       Y
 3      C      F       Z
```

Solution: Use a BY statement.

```
data char3;
   merge char1 char2;
   by a; /* the input data is already sorted */
run;
```

The resulting data set now contains the correct data:

```
Obs    one    two    three

 1      A      B       X
 2      B              Y
 3      C      D       Z
```

19. Merging on one common variable when there is more than one common variable.

data set CHAR1

one	two
A	B
C	D
E	F

data set CHAR4

one	two
A	X
B	Y
C	Z

```
data char5;
   merge char1 char4;
  by one; /* the data is already sorted */
run;
```

When the two data sets are merged only on the variable A, the values of B from the data set CHAR4 overwrite the values of B from the data set CHAR1. The resulting data set follows:

```
Obs    one    two

 1      A      X
 2      B      Y
 3      C      Z
```

Solution: Merge on all like-named variables.

```
data char6;
   merge char1 char4;
    by one two; /* the data is already sorted */
run;
```

The resulting data follows:

```
Obs    one    two

 1      A      B
 2      A      X
 3      B      Y
 4      C      D
 5      C      Z
 6      E      F
```

Alternate Solution: Rename all of the like-named variables except the variable on which the merge should be done.

```
data char7;
   merge char1 char4(rename=(Two=NewTwo));
   by one; /* the data is already sorted */
run;
```

The resulting data follows:

```
                     New
Obs   one    two     Two

 1     A      B       X
 2     B              Y
 3     C      D       Z
 4     E      F
```

20. Forgetting to reset an option.

```
options obs = 10;

proc print data = perm.one;
run;
proc sort data = perm.one;
   by x;
run;
```

Solution: Reset the option. In the case of the OBS = option, use OBS = MAX to read all of the data.

```
options obs = max;
proc sort data = perm.one;
   by x;
run;
```

21. Reading in delimited data incorrectly.

locations.dat

```
Libertyville, Lake, IL
Kansas City,,KS
```

```
data locations;
   infile 'locations.dat';
   input City : $12. County : $10. State : $2.;
run;
```

The problem here is that no delimiter has been specified; therefore, the default delimiter of a blank is being used. The resulting data set follows:

```
Obs        City         County     State

 1      Libertyville    Lake,       IL
```

Solution: See Number 23.

22. Reading in delimited data incorrectly (Version 2).

```
data locations;
   infile 'locations.dat' dlm = ',';
   input City : $12. County : $10. State : $2.;
run;
```

This is a good start to fixing the problem. However, multiple delimiters are treated as one delimiter, causing the INPUT statement to reach the end of the line in the second observation. The resulting data set is no different than it was for the previous example.

Solution: See Number 23.

23. Reading in delimited data incorrectly (Version 3).

```
data locations;
   infile 'locations.dat' dlm = ',' missover;
   input City : $12. County : $10. State : $2.;
run;
```

The MISSOVER option prevents the INPUT statement from reaching the end of the line. However, for the second observation, the value of COUNTY is read in as KS. The resulting data follows:

```
Obs         City          County     State

 1      Libertyville       Lake       IL
 2      Kansas City       KS
```

Solution to all three: Use the DSD option in the INFILE statement.

```
data locations;
   infile 'locations.dat' dlm = ',' missover dsd;
   input City : $12. County : $10. State : $2.;
run;
```

The DSD option (Delimiter-Sensitive Data) uses a comma as the default delimiter, treats consecutive commas as a missing value, and reads a character value enclosed in quotation marks and removes the quotation marks from the character string before the value is stored. The resulting data set follows:

```
Obs         City          County     State

 1      Libertyville       Lake       IL
 2      Kansas City                   KS
```

24. Reading mixed record types incorrectly.

holiday.dat

```
US,Independence Day,04Jul2009
FR,Bastille Day,14-7-2009
```

```
data Holiday;
   infile 'holiday.dat' dsd;
   input Country : $2. Holiday  : $16.;
   if Country = 'US' then input Date : date9.;
   else input Date : ddmmyy10.;
   format date mmddyy10.;
run;
```

The resulting data follows:

```
Obs     Country         Holiday                   Date

 1         US       Independence Day                 .
```

Solution: Use multiple INPUT statements with a single trailing @ sign and check a condition before reading more data. The single trailing @ sign holds the current record in the input buffer so that the second INPUT statement can continue to read from that record.

```
data Holiday;
   infile 'holiday.dat' dsd;
   input Country : $2. Holiday : $16. @;
   if Country = 'US' then input Date : date9.;
   else input Date : ddmmyy10.;
   format date mmddyy10.;
run;
```

Alternate Solution: Use the DATASTYLE= SAS system option and the ANYDTDTE informat on the Date variable. The DATESTYLE= SAS system option identifies the order of month, day, and year. The default value of LOCALE uses the style that has been specified by the LOCALE= system option. The ANYDTDTE informat reads dates in various informats.

```
options datestyle = locale;
data Holiday;
   infile 'holiday.dat' dsd;
   input Country : $2. Holiday : $16. Date : anydtdte10.;
   format date mmddyy10.;
run;
```

25. Using the NODUPKEY option with PROC SORT and losing the duplicate observations.

```
data test;
   infile datalines @@;
   input Name $;
datalines;
John Bill Sam Bill Tom Joe Chris Bill John Kent Chris
;
run;

proc sort data = test nodupkey;
   by Name;
run;
```

Solution: Use the DUPOUT= option in the PROC SORT statement and name a data set that contains the duplicate observations.

```
proc sort data = test nodupkey dupout = extras;
run;
```

26. Merging to make changes to data.

data set Grocery

ID	Name	Job	Salary
1065	Bob	Clerk	35090
1112	Sue	Manager	55890
1117	Sam	Bagger	31298
1350	Peg	Stocker	25897

data set Update

ID	Name	Job	Salary
1065		Manager	45125
1117			33589
1350		Bagger	
1350			30876

```
data updated_grocery;
   merge grocery update;
   by idnum;
run;
```

Because the MERGE processes data sequentially and the like-named variables in the data set Update overwrite the variables from Grocery, the resulting data set is improperly updated. The resulting data set follows.

```
Obs    ID        Name      Job          Salary

 1     1065                Manager       45125
 2     1112      Sue       Manager       55890
 3     1117                              33589
 4     1350                Bagger
 5     1350                              30876
```

Solution: Use the UPDATE statement instead of the MERGE statement.

```
data updated_grocery;
   update grocery update;
   by idnum;
run;
```

The UPDATE statement changes the values of selected observations in a master file by applying transactions. If the data in the transaction data set is missing, the UPDATE statement does not overwrite existing values in the master data set with missing ones in the transaction data set. The resulting data set follows.

```
Obs     ID         Name      Job        Salary

 1      1065       Bob       Manager     45125
 2      1112       Sue       Manager     55890
 3      1117       Sam       Bagger      33589
 4      1350       Peg       Bagger      30876
```

27. Reading hierarchical files and losing the last observation.

pets.dat

```
1 Michelle
   Max cat
   Fuschia cat
2 Theresa
   Paisley dog
   Sitka dog
3 Jane
4 Nancy
   Winston cat
```

```
data pets;
   retain Name;
   keep Name NumDogs NumCats NumOther;
   infile 'pets.dat';
   input @1 FirstChar : $1. @;
   if FirstChar in ('1','2','3','4','5','6','7','8','9') then do;
      if _n_ ne 1 then output;
      input Name : $8.;
      NumDogs = 0;
      NumCats = 0;
      NumOther = 0;
   end;
   else do;
       input @1 PetName : $15. Pet : $3.;
      if upcase(Pet) = 'DOG' then NumDogs + 1;
      else if upcase(Pet) = 'CAT' then NumCats + 1;
      else NumOther + 1;
   end;
run;
```

The resulting data set follows.

```
                    Num     Num     Num
Obs   Name         Dogs    Cats    Other

 1    Michelle       0       2       0
 2    Theresa        2       0       0
 3    Jane           0       0       0
```

Solution: Specify the END= option in the INFILE statement and use conditional logic to output the last observation.

```
data pets;
   retain Name;
   keep Name NumDogs NumCats NumOther;
   infile 'pets.dat' end = LastObs;
   input @1 FirstChar : $1. @;
   if FirstChar in ('1','2','3','4','5','6','7','8','9') then do;
     if _n_ ne 1 then output;
     input Name : $8.;
     NumDogs = 0;
     NumCats = 0;
     NumOther = 0;
   end;
   else do;
      input @1 PetName : $15. Pet : $3.;
     if upcase(Pet) = 'DOG' then NumDogs + 1;
     else if upcase(Pet) = 'CAT' then NumCats + 1;
     else NumOther + 1;
   end;
   if LastObs then output;
run;
```

The resulting data set follows.

```
                        Num     Num      Num
Obs     Name           Dogs    Cats    Other

 1      Michelle         0       2        0
 2      Theresa          2       0        0
 3      Jane             0       0        0
 4      Nancy            0       1        0
```

28. Allowing automatic conversion of numeric to character values.

Data set Numbers

NumValue
1234
5498
5698

```
data character;
   set Numbers;
   CharValue = substr(NumValue, 1, 4);
run;
```

When automatic conversion of numeric data to character values occurs, the digits are written out in 12 spaces and are right aligned; therefore, the first four characters would be blank. The resulting data set follows.

```
Obs          NumValue      CharValue

 1             1234
 2             5498
 3             5698
```

Alternate Solution: Use the PUT function with a specific number of digits if you know the number of digits.

```
data character;
   set Numbers;
   CharValue = substr(put(NumValue, 4.), 1, 4);
run;
```

Alternate Solution: Use LEFT function along with the PUT function with a specific number of digits if you do not know the number of digits

```
data character;
   set Numbers;
   CharValue = substr(left(put(NumValue, 4.)), 1, 4);
run;
```

29. Not specifying the KEY variable as a DATA item when using the hash object with the OUTPUT method.

```
data _null_  ;
   length List $100;
   if _n_ = 1 then do;
      declare hash ph();
     ph.DefineKey('Date');
     ph.DefineData('List');
     ph.DefineDone();
   end;
   set PhoneCalls end = last;
   if ph.find() ne 0 then do;
      List = PhoneNum;
     ph.add();
   end;
   else do;
     List = catx(', ',List, PhoneNum);
     ph.replace();
   end;
   if last then ph.output(dataset:'PhoneList');
run;
```

A partial listing of the data set PhoneCalls follows:

```
Obs          Date     PhoneNum

  1     21DEC2006     324-6674
  2     21DEC2006     312-5098
  3     21DEC2006     312-9088
  4     21DEC2006     324-3452
  5     21DEC2006     312-7483
  6     21DEC2006     324-8943
  7     21DEC2006     312-7456
```

The variable DATE is not in the resulting data set.

```
Obs    List

 1     324-6674, 312-5098, 312-9088, 324-3452, 312-7483, 324-8943, 312-7456, 324-4544
 2     312-5098, 312-4755, 389-0098, 324-6674
 3     312-9088, 324-3452, 312-7456, 312-5098, 324-8943, 312-5098
```

Solution: Add the KEY variable as one of the DATA columns in the DEFINEDATA method. By default, the KEY variable is not included as part of the data.

```
data _null_  ;
   length List $100;
   if _n_ = 1 then do;
      declare hash ph();
     ph.DefineKey('Date');
     ph.DefineData('Date', 'List');
     ph.DefineDone();
   end;
   set PhoneCalls end = last;
   if ph.find() ne 0 then do;
      List = PhoneNum;
     ph.add();
   end;
   else do;
     List = catx(', ',List, PhoneNum);
    ph.replace();
   end;
   if last then ph.output(dataset:'PhoneList');
run;
```

30. Having duplicate keys when using a hash object. Only the first one is loaded into the hash object.

```
data all_inquiries;
   drop rc;
   length Product_ID 8;
   if _N_ = 1 then do;
      declare hash h(dataset:'orders');
      h.defineKey('Order_ID');
      h.defineData('Order_ID', 'Product_ID');
      h.defineDone();
     call missing(Product_ID);
   end;
   set inquiries;
   rc=h.find();
run;
```

Solution: Use the MULTIDATA : 'YES' parameter in the DECLARE statement. MULTIDATA is a SAS 9.2 enhancement to the hash object syntax which allows multiple data items for each non-unique key.

```
data all_inquiries;
   drop rc;
   length Product_ID 8;
   if _N_ = 1 then do;
      declare hash h(dataset:'orders', multidata:'yes');
      h.defineKey('Order_ID');
      h.defineData('Order_ID', 'Product_ID');
      h.defineDone();
     call missing(Product_ID);
   end;
   set inquiries;
   rc = h.find();
   do while (rc = 0);
      output;
      rc=h.find_next();
  end;
run;
```

31. Not including automatic variables in your data.

```
proc sort data = perm.class out = class;
   by Group;
run;

data Summary;
   set class nobs = NumObs;
   keep Group AvgAge TotAge NumObs Count;
   by Group;
   if first.Group then do;
      TotAge = 0;
     Count = 0;
   end;
   TotAge + Age;
   Count + 1;
   if last.Group then do;
      AvgAge = TotAge / Count;
     output;
   end;
run;
```

Solution: Create a DATA step variable that contains the value of the NOBS= variable, NUMOBS.

```
data Summary;
   set class nobs = NumObs;
   keep Group AvgAge TotAge TotObs Count;
   TotObs = NumObs;
   by Group;
   if first.Group then do;
      TotAge = 0;
     Count = 0;
   end;
   TotAge + Age;
   Count + 1;
   if last.Group then do;
      AvgAge = TotAge / Count;
     output;
   end;
run;
```

32. Reading from multiple raw data files in one DATA step.

There are three raw data files with the same fields but a different number of records. The DATA step stops when execution reaches the end of file for the raw data file with the least number of records. Therefore, the DATA step never reads the rest of the other raw data files.

```
Bill 32
John 38
Beth 33
Sue 35
```

```
data names;
   infile 'names1.dat';
   input Name $ Age;
   output;
   infile 'names2.dat';
   input Name $ Age;
   output;
   infile 'names3.dat';
   input Name $ Age;
   output;
run;
```

Solution: Use the FILEVAR = option in the INFILE statement to specify a variable whose change in value causes the INFILE statement to close the current input file and open a new one. In addition, use a DO WHILE loop to read all of the records of each raw data file.

```
data routes;
   length Readit $10;
   input ReadIt;
   infile in filevar = ReadIt end = LastFile pad;
   do while(LastFile = 0);
     input Name $ Age;
    output;
   end;
datalines;
names1.dat
names2.dat
names3.dat
;
run;
```

BAD LOGIC

33. Having a never met condition on a WHERE statement.

```
proc sort data = one;
   by x;
   where x = 12;
run;
```

Solution: Create a data set using the OUT= option. In this case, the data set TWO would be empty, but the integrity of the data set ONE is maintained.

```
proc sort data = one out = two;
   by x;
   where x = 12;
run;
```

34. Omitting a condition on an IF statement.

```
data one;
   set one;
   if x then delete;
run;
```

Solution: By not specifying a value for the variable X, the condition IF X is true as long as X is not 0 and X is not missing. Therefore, all of the observations with a nonzero value of X are deleted.

```
data one;
   set one;
   if x = 12 then delete;
run;
```

35. Specifying a false condition when using the DATA step with a MODIFY statement and a WHERE statement.

```
data one;
   modify one;
   x = x * 2;
   where x = 12;
run;
```

Solution: Use the IF statement instead of the WHERE statement.

```
data one;
   modify one;
   x = x * 2;
   if x = 12;
run;
```

36. **Omitting a LENGTH statement.**

```
data char;
   input a $ b $;
   datalines;
ONE TWO
THREE FOUR
FIVE SIX
SEVEN EIGHT
NINE TEN
;
data NewChar;
  set char;
  A = A||B;
run;
```

Solution: Use a LENGTH statement before the SET statement.

```
data NewChar;
  length A $ 16;
  set char;
  A = A||B;
run;
```

37. **Using the SCAN function with multiple delimiters.**

```
data test;
   input pets : $20.;
   pet2 = scan(pets, 2, ',');
   datalines;
cat,dog,fish
dog,,bird
;
run;
```

Solution: By default, the SCAN function treats multiple delimiters as one delimiter. In addition, any delimiters before or after the string are ignored. Use the 'M' option as the fourth option in the SCAN function (a 9.2 enhancement). It specifies that multiple consecutive delimiters (and any at the beginning or end of the first argument) are treated as missing values between the delimiters; therefore, the variable being created has a missing value.

```
data test;
   input pets : $20.;
   pet2=scan(pets, 2, ',', 'M');
   datalines;
cat,dog,fish
dog,,bird
;
run;
```

38. Creating a random sample with the RANUNI function when you need to recreate the same sample later.

```
data subset;
   do I = 1 to 10;
      x = int(num * ranuni(0));
      set Seuss point = x nobs = num;
     output;
   end;
   stop;
run;
```

Solution: Use a positive integer as the seed in the RANUNI function.

```
data subset;
   do I = 1 to 10;
      x = int(num * ranuni(12345));
      set Seuss point = x nobs = num;
     output;
   end;
   stop;
run;
```

INTENTIONALLY DELETING DATA SETS

39. Using the DATASETS procedure to delete the entire data set.

```
proc datasets lib = work;
   delete one;
run;
```

40. Using the SQL procedure to drop a data set.

```
proc sql;
   drop table one;
quit;
```

41. Using the Explorer window to delete a data set.

Right-click on a SAS data set in the Explorer window and select DELETE. Be careful because this does not put the data set into the Windows recycle bin.

42. Using the VIEWTABLE window to delete rows from a SAS data set.

- Double-click on the data set in the Explorer window.
- From the Menu bar, select EDIT → Edit Mode.
- Click on the row to be deleted.
- From the Menu bar, select EDIT → Delete Row.

43. Use PROC SQL with the DELETE FROM statement correctly.

```
proc sql;
   delete from one where x = 12;
quit;
```

HARDWARE PROBLEMS

44. Losing your laptop; for example, leaving it at security at the airport.

45. Having your hard drive crash.

46. System interruptions; for example, IT takes the system down for maintenance while your program is executing.

47. Backing up your data on tape and then destroying the tape.

48. Power outages during program execution.

Solution to all of these: Back up your data.

CONCLUSION

There might not be 50 ways to lose your data, but there are many. We just hope you cannot think of any more, 48 are enough!

Furthermore, we hope you never accidentally lose your data because we hope you always back it up. Make sure you have no syntax errors or logic mistakes. In addition, it is critical that you know your data. Using the CONTENTS procedure and the PRINT procedure to familiarize yourself with the data attributes and the data values can help prevent data destruction.

Always remember: Think before you submit.

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