

Handbook of SAS® Data Step Programming

Execution Phase of Program 3.8

Arthur Li

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K

- ❖ The execution phase begins immediately after the completion of the compilation phase
- ❖ `_ERROR_` is not shown for simplicity purpose

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1				

1st iteration:

❖ $_N_ \leftarrow 1$

❖ Other variables \leftarrow *missing*

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
→ set wide;  
time = 1;  
score = s1;  
if not missing(score) then output;  
time = 2;  
score = s2;  
if not missing(score) then output;  
time = 3;  
score = s3;  
if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		.		.	



1st iteration:

❖ 1st observation from the wide → PDV

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		1		.	



1st iteration:

❖ Time \leftarrow 1

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		1		3	



1st iteration:

❖ Score ← value from S1(3)

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		1		3	



1st iteration:

❖ SCORE ≠ missing: ID, TIME, and SCORE → Long

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		2		3	



1st iteration:

❖ TIME ← 2

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		2		4	



1st iteration:

❖ Score ← value from S2(4)

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		2		4	

1st iteration:

❖ SCORE *≠ missing*: ID, TIME, and SCORE → Long

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		3		4	



1st iteration:

❖ TIME ← 3

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		3		5	



1st iteration:

❖ SCORE ← value from S3(5)

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		3		5	



1st iteration:

❖ SCORE *≠ missing*: ID, TIME, and SCORE → Long

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
1		A01		3		4		5		3		5	

1st iteration:

- ❖ There is no more implicit OUTPUT statement
- ❖ SAS returns to the beginning of the DATA step to begin the 2nd iteration

Execution Phase of Program 3.8

```
→ data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A01		3		4		5		.		.	

2nd iteration:

- ❖ _N_ ↑ 2
- ❖ ID and S1-S3 are retained from the previous iteration
- ❖ TIME, SCORE ← missing

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
→ set wide;  
time = 1;  
score = s1;  
if not missing(score) then output;  
time = 2;  
score = s2;  
if not missing(score) then output;  
time = 3;  
score = s3;  
if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		.		.	



2nd iteration:

❖ 2nd observation from the Wide → PDV

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		1		.	



2nd iteration:

❖ TIME ← 1

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		1		4	



2nd iteration:

❖ SCORE ← value from S1 (4)

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		1		4	



2nd iteration:

❖ ID, TIME, and SCORE → Long

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		2		4	



2nd iteration:

❖ TIME ← 2

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		2		.	



2nd iteration:

❖ SCORE ← the value from S2 (*missing*)

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
→ if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		2		.	

2nd iteration:

❖ SCORE = *missing*: no output is generated

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		3		2	



2nd iteration:

❖ SCORE ← the value from S3 (2)

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4
5	A02	3	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		3		2	



2nd iteration:

❖ ID, TIME, and SCORE → Long

Execution Phase of Program 3.8

```
data long (drop=s1-s3);  
  set wide;  
  time = 1;  
  score = s1;  
  if not missing(score) then output;  
  time = 2;  
  score = s2;  
  if not missing(score) then output;  
  time = 3;  
  score = s3;  
  if not missing(score) then output;  
run;
```

Wide:

	ID	S1	S2	S3
1	A01	3	4	5
2	A02	4	.	2

Long:

	ID	TIME	SCORE
1	A01	1	3
2	A01	2	4
3	A01	3	5
4	A02	1	4
5	A02	3	2

PDV

N	D	ID	K	S1	D	S2	D	S3	D	TIME	K	SCORE	K
2		A02		4		.		2		3		2	

2nd iteration:

- ❖ SAS returns to the beginning of the DATA step to begin the 3rd iteration
- ❖ With no more observations to read in the 3rd iteration, SAS goes to the next DATA or PROC step