
DATE 05-03-2025 14 16 40 USER FRTRN90 JOB BNCHMRK PAGE 0000

BNCHMRK FRTRN90 FILE NAME/TYPE TESTIN/TEST4.F90

BNCHMRK FRTRN90

BNCHMRK FRTRN90 CREATION DATE/TIME 05-03-2025 14 16 40

BNCHMRK FRTRN90

BNCHMRK FRTRN90 FILE 001 PAGES 0002 LINES 000082

BNCHMRK FRTRN90

BNCHMRK FRTRN90 SYSTEM LINUX 6.12.13-AMD64

BNCHMRK FRTRN90

BNCHMRK FRTRN90 SYSID ACID SYSUSER ACID

BNCHMRK FRTRN90

BNCHMRK FRTRN90 FORM SMALL

BNCHMRK FRTRN90

BNCHMRK FRTRN90 CHAR FONT1403

BNCHMRK FRTRN90

BNCHMRK FRTRN90 PRT1403 VERSION 1.5.PRE-RELEASE

FFFFFFFF	RRRRRRRR	TTTTTTTT	RRRRRRRR	N	NN	9999999	00000
FFFFFFFF	RRRRRRRR	TTTTTTTT	RRRRRRRR	NN	NN	99999999	0000000
FF	RR	RR	TT	RR	RR	NNN	NN 99 99 00 00
FF	RR	RR	TT	RR	RR	NNNN	NN 99 99 00 00
FFFFFFFF	RRRRRRRR	TT	RRRRRRRR	NN	NN	NN	99999999 00 00
FFFFFFFF	RRRRRRRR	TT	RRRRRRRR	NN	NN	NN	99999999 00 00
FF	RR	RR	TT	RR	RR	NN	NNNN 99 00 00
FF	RR	RR	TT	RR	RR	NN	NNN 99 00 00
FF	RR	RR	TT	RR	RR	NN	NN 99999999 0000000
FF	RR	RR	TT	RR	RR	NN	N 9999999 00000

BBBBBBBB	N	NN	CCCCCCC	HH	HH	M	M	RRRRRRRR	KK	KK
BBBBBBBB	NN	NN	CCCCCCCC	HH	HH	MM	MM	RRRRRRRR	KK	KK
BB	BB	NNN	NN CC	CC	HH	HH	MMM	MMM	RR	RR KK KK
BB	BB	NNNN	NN CC		HH	HH	MMMM	MMMM	RR	RR KK KK
BBBBBBBB	NN	NN	NN CC		HHHHHHHH	MM	MM	MM	RRRRRRRR	KKKKK
BBBBBBBB	NN	NN	NN CC		HHHHHHHH	MM	M	MM	RRRRRRRR	KK KK
BB	BB	NN	NNNN CC		HH	HH	MM	MM	RR	RR KK KK
BB	BB	NN	NNN CC	CC	HH	HH	MM	MM	RR	RR KK KK
BBBBBBBB	NN	NN	CCCCCCCC		HH	HH	MM	MM	RR	RR KK KK
BBBBBBBB	NN	N	CCCCCCC		HH	HH	MM	MM	RR	RR KK KK

00000	00000	1
0000000	0000000	11
00	00 00	111
00	00 00	11
00	00 00	11
00	00 00	11
00	00 00	11
00	00 00	11
0000000	0000000	111111
00000	00000	111111

```
1 PROGRAM LID DRIVEN CAVITY
2 IMPLICIT NONE
3 INTEGER, PARAMETER N = 50 GRID SIZE NXN GRID
4 REAL DX, DY, DT, RE GRID SPACING, TIME STEP, REYNOLDS NUMBER
5 REAL U N, N, V N, N, P N, N VELOCITY AND PRESSURE FIELDS
6 INTEGER I, J, STEP
7 REAL START TIME, END TIME, ELAPSED TIME
```

PARAMETERS

```
10 DX 1.0 / N-1 GRID SPACING IN X DIRECTION
11 DY 1.0 / N-1 GRID SPACING IN Y DIRECTION
12 DT 0.001 TIME STEP SIZE
13 RE 100 REYNOLDS NUMBER
```

INITIALIZE ARRAYS

```
16 U 0.0
17 V 0.0
18 P 0.0
```

INITIALIZE THE TOP BOUNDARY LID VELOCITY

```
20 U N, 1.0
```

START TIMING

```
24 CALL CPU TIME START TIME
```

MAIN LOOP FOR TIME STEPPING

```
27 DO STEP 1, 1000
```

```
28 CALL COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
```

```
29 CALL UPDATE PRESSURE P, DX, DY
```

OUTPUT OR CHECK CONVERGENCE

```
32 IF MOD STEP, 100 0 THEN
```

```
33 PRINT *, STEP, STEP
```

```
34 END IF
```

```
35 END DO
```

STOP TIMING

```
38 CALL CPU TIME END TIME
```

```
39 ELAPSED TIME END TIME - START TIME
```

```
40 PRINT *, ELAPSED TIME FOR CFD SIMULATION, ELAPSED TIME, SECONDS
```

CONTAINS

FUNCTION TO UPDATE THE VELOCITY AND PRESSURE FIELDS SIMPLIFIED

```
45 SUBROUTINE COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
```

```
46 REAL, DIMENSION, , INTENT INOUT U, V, P
```

```
47 REAL, INTENT IN DX, DY, DT, RE
```

```
48 INTEGER I, J
```

SIMPLE EXPLICIT METHOD FOR VELOCITY SIMPLIFIED

```
50 DO I 2, N-1
```

```
52 DO J 2, N-1
```

```
53 U I, J = U I, J - DT * ( U I, J * U I+1, J - U I-1, J / 2*DX
```

```
54 V I, J * U I, J+1 - U I, J-1 / 2*DY
```

```
55 END DO
```

```
56 END DO
```

SIMPLE VELOCITY UPDATE FOR V SIMILAR

```
59 DO I 2, N-1
```

```
60 DO J 2, N-1
```

```
1      V I, J      V I, J - DT *      U I, J * V I+1, J - V I-1, J      / 2*DX
2      V I, J * V I, J+1 - V I, J-1      / 2*DY
3      END DO
4      END DO
5      END SUBROUTINE COMPUTE VELOCITY
6
7      FUNCTION TO SOLVE FOR PRESSURE SIMPLIFIED POISSON EQUATION SOLVER
8      SUBROUTINE UPDATE PRESSURE P, DX, DY
9      REAL, DIMENSION , , INTENT INOUT      P
10     REAL, INTENT IN      DX, DY
11     INTEGER      I, J
12
13     SIMPLE PRESSURE POISSON EQUATION JACOBI ITERATION
14     DO I      2, N-1
15         DO J      2, N-1
16             P I, J      0.25 *      P I+1, J + P I-1, J + P I, J+1 + P I, J-1
17         END DO
18     END DO
19     END SUBROUTINE UPDATE PRESSURE
20
21     END PROGRAM LID DRIVEN CAVITY
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
```