************************************* FRTRN90 14-02-2025 13 45 06 USER JOB. **BNCHMRK** PAGE 0000 3 3 FRTRN90 FILE NAME/TYPE TESTIN/TEST4.F90 BNCHMRK 5 **BNCHMRK** FRTRN90 **BNCHMRK** FRTRN90 CREATION DATE/TIME 14-02-2025 13 45 06 8 9 **BNCHMRK** FRTRN90 **BNCHMRK** FRTRN90 FILE 001 PAGES 0002 LINES 000081 8 **BNCHMRK** FRTRN90 12 **BNCHMRK** SYSTEM LINUX 6.11.2-AMD64 10 FRTRN90 **BNCHMRK** FRTRN90 11 15 SYSID ACID SYSUSER **BNCHMRK** FRTRN90 ACID 16 17 **BNCHMRK** FRTRN90 18 **BNCHMRK** FRTRN90 SYSUSER ACID 14 19 BNCHMRK FRTRN90 **BNCHMRK** FRTRN90 FORM STANDARD **BNCHMRK** FRTRN90 23 **BNCHMRK** FRTRN90 CHAR **FONT1403** 19 26 20 2 28 FFFFFFFF RRRRRRR TTTTTTT RRRRRRRR 9999999 00000 29 N NN 30 23 FFFFFFFF RRRRRRRR TTTTTTTT RRRRRRRR NN NN 99999999 0000000 FF RR TT RR NNN 00 RR RR NN 99 99 00 32 33 FF RR RR TT RR NNNN 99 00 00 25 NN 99 34 FFFFFFFF 26 RRRRRRRRR TT RRRRRRRR NN NN NN 99999999 00 00 FFFFFFFF RRRRRRRR TT RRRRRRRR NN NN NN 9999999 00 00 36 FF RR RR TT RR NN NNNN 99 00 00 37 28 38 FF RR TT NN NNN 00 RR RR RR 99 00 29 39 FF RR RR TT RR RR NN NN 9999999 0000000 30 40 FF TT 41 RR RR RR RR NN 9999999 00000 31 42 43 44 BBBBBBBB CCCCCCC НН M RRRRRRR 45 N NN HH M KKKKKKKKK 34 46 NN NN CCCCCCCC HH HH RRRRRRRR KKKKKKKK 35 BBBBBBBBB MM MM 47 BB NNN NN CC CC HH MMM RR RR KKKKKKKKK 36 HH MMM 48 37 BB **BB NNNN** NN CC HH HH MMMM MMMM RR RR KKKKKKKKK 49 50 **BBBBBBBB** NN NN NN CC **НННННННН** MM MMM MM RRRRRRRR KKKKKKKK 38 51 RRRRRRRR **BBBBBBBB** NN NN NN CC **НННННННН** MM MM KKKKKKKKK 39 52 RR 53 BB **BB NN** NNNN CC HH HH MM MM RR KKKKKKKKK 40 54 BB **BB NN** NNN CC CC HH HH MM RR RR KKKKKKKKK 41 MM NN CCCCCCCC HH BBBBBBBBB NN HH MM MM RR RR KKKKKKKKK 56 **BBBBBBBB** CCCCCCC RR KKKKKKKKK 43 NN HH HH MM MM RR 58 44 59 45 60 00000 00000 1 62 0000000 0000000 11 47 63 48 00 00 00 00 111 64 00 00 00 00 11 **4**C 00 00 00 00 11 50 00 00 00 00 11 51 00 00 00 00 11 70 00 00 00 00 11 53 0000000 0000000 111111 54 73 00000 00000 111111 55 56 78

1412THE

```
PROGRAM LID DRIVEN CAVITY
     IMPLICIT NONE
                                                                                           3
      INTEGER, PARAMETER N 50 GRID SIZE NXN GRID
  3
              DX, DY, DT, RE GRID SPACING, TIME STEP, REYNOLDS NUMBER
      REAL
              U N, N, V N, N, P N, N VELOCITY AND PRESSURE FIELDS
      INTEGER I, J, STEP
  6
              START TIME, END TIME, ELAPSED TIME
  7
      REAL
                                                                                          10
  8
        PARAMETERS
  9
           1.0 / N-1
                           GRID SPACING IN X DIRECTION
  10
      DX
                           GRID SPACING IN Y DIRECTION
  11
      DY
           1.0 / N-1
                                                                                          15
                           TIME STEP SIZE
  12
      DT
           0.001
      RE
                           REYNOLDS NUMBER
  13
           100
                                                                                          18
  14
                                                                                           19
  15
       INITIALIZE ARRAYS
          0.0
  16
  17
      ٧
          0.0
      P
         0.0
  18
  19
                                                                                          26
        INITIALIZE THE TOP BOUNDARY LID VELOCITY
  21
      U N, 1.0
                                                                                          29
  22
                                                                                          30
23
       START TIMING
      CALL CPU TIME START TIME
  24
                                                                                          33
  25
                                                                                          34
        MAIN LOOP FOR TIME STEPPING
  26
                                                                                          35
      DO STEP 1, 1000
  27
                                                                                          36
         CALL COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
  28
         CALL UPDATE PRESSURE P, DX, DY
  29
                                                                                          39
  30
                                                                                          40
           OUTPUT OR CHECK CONVERGENCE
                                                                                          41
  31
                                                                                          42
  32
         IF MOD STEP, 100 O THEN
                                                                                          43
             PRINT *, STEP , STEP
  33
                                                                                          44
                                                                                          45
         END IF
  34
                                                                                          46
      END DO
  35
                                                                                          47
  36
                                                                                          48
  37
      STOP TIMING
                                                                                          49
      CALL CPU TIME END TIME
  38
      ELAPSED TIME END TIME - START TIME
  39
                                                                      SECONDS
                                                                                          53
      PRINT *, ELAPSED TIME FOR CFD SIMULATION , ELAPSED TIME,
                                                                                          54
  41
  42 CONTAINS
  43
                                                                                          58
        FUNCTION TO UPDATE THE VELOCITY AND PRESSURE FIELDS SIMPLIFIED
  44
                                                                                          59
      SUBROUTINE COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
  45
        REAL, DIMENSION , , INTENT INOUT
  47
        REAL, INTENT IN
                            DX, DY, DT, RE
  48
        INTEGER I, J
  49
          SIMPLE EXPLICIT METHOD FOR VELOCITY SIMPLIFIED
  50
        DO I 2, N-1
  51
            DO J 2, N-1
  52
                U I, J U I, J - DT *
                                             UI, J * UI+i, J - UI-i, J
                                                                                  / 2*DX
                                             V I, J * U I, J+1 - U I, J-1
  54
                                                                                     2*DY
            END DO
        END DO
  56
          SIMPLE VELOCITY UPDATE FOR V SIMILAR
  58
                                                                                          78
        DO I 2, N-1
  59
                                                                                          79
```

DO J 2, N-1

60