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DATE   26-02-2025 13 09 42      USER   FRTRN90        JOB   BNCHMRK          PAGE  0000

BNCHMRK      FRTRN90      FILE NAME/TYPE  TESTIN/TEST4.F90
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      CREATION DATE/TIME   26-02-2025 13 09 42
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      FILE  001   PAGES  0002   LINES  000082
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BNCHMRK      FRTRN90      SYSTEM   LINUX 6.12.13-AMD64
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   FF        RR    RR     TT     RR     RR NNN    NN 99     99 00     00
   FF        RR    RR     TT     RR     RR NNNN   NN 99     99 00     00
   FFFFFFFFF RRRRRRRRR    TT     RRRRRRRRR NN NN  NN 999999999 00     00
   FFFFFFFFF 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


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   BB     BB NNN    NN CC     CC HH      HH MMM   MMM RR     RR KK  KK
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   BB     BB NN    NNN CC     CC HH      HH MM     MM RR  RR   KK   KK
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                        00000      00000     111111


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 DATE   26-02-2025 13 09 42 *******************************************************
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```
PROGRAM LID DRIVEN CAVITY
  IMPLICIT NONE
  INTEGER, PARAMETER    N  50     GRID SIZE  NXN GRID
  REAL    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
  REAL    START TIME, END TIME, ELAPSED TIME

    PARAMETERS
  DX  1.0 /  N-1      GRID SPACING IN X DIRECTION
  DY  1.0 /  N-1      GRID SPACING IN Y DIRECTION
  DT  0.001          TIME STEP SIZE
  RE  100            REYNOLDS NUMBER

    INITIALIZE ARRAYS
  U   0.0
  V   0.0
  P   0.0

    INITIALIZE THE TOP BOUNDARY  LID  VELOCITY
  U N,      1.0

    START TIMING
  CALL CPU TIME START TIME

    MAIN LOOP FOR TIME STEPPING
  DO STEP   1, 1000
     CALL COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
     CALL UPDATE PRESSURE P, DX, DY

      OUTPUT OR CHECK CONVERGENCE
     IF  MOD STEP, 100     0  THEN
        PRINT *,  STEP   , STEP
     END IF
  END DO

    STOP TIMING
  CALL CPU TIME END TIME
  ELAPSED TIME   END TIME - START TIME
  PRINT *,  ELAPSED TIME FOR CFD SIMULATION  , ELAPSED TIME,   SECONDS

CONTAINS

    FUNCTION TO UPDATE THE VELOCITY AND PRESSURE FIELDS  SIMPLIFIED
  SUBROUTINE COMPUTE VELOCITY U, V, P, DX, DY, DT, RE
     REAL, DIMENSION  ,  , INTENT INOUT    U, V, P
     REAL, INTENT IN    DX, DY, DT, RE
     INTEGER    I, J

      SIMPLE EXPLICIT METHOD FOR VELOCITY  SIMPLIFIED
     DO I   2, N-1
        DO J   2, N-1
           U I, J    U I, J - DT *    U I, J * U I+1, J  - U I-1, J    / 2*DX
                              V I, J * U I, J+1  - U I, J-1    / 2*DY
        END DO
     END DO

      SIMPLE VELOCITY UPDATE FOR V  SIMILAR
     DO I   2, N-1
        DO J   2, N-1
```

```fortran
          V I, J    V I, J  - DT *    U I, J  *  V I+1, J  - V I-1, J    /  2*DX
                                      V I, J  *  V I, J+1  - V I, J-1    /  2*DY
        END DO
      END DO
   END SUBROUTINE COMPUTE VELOCITY

    FUNCTION TO SOLVE FOR PRESSURE  SIMPLIFIED POISSON EQUATION SOLVER
   SUBROUTINE UPDATE PRESSURE P, DX, DY
     REAL, DIMENSION  ,  , INTENT INOUT     P
     REAL, INTENT IN    DX, DY
     INTEGER    I, J

       SIMPLE PRESSURE POISSON EQUATION  JACOBI ITERATION
     DO I   2, N-1
       DO J   2, N-1
          P I, J    0.25 *   P I+1, J  + P I-1, J  + P I, J+1  + P I, J-1
       END DO
     END DO
   END SUBROUTINE UPDATE PRESSURE

END PROGRAM LID DRIVEN CAVITY
```