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DATE   20-11-2025 14 10 38      USER   FRTRN90      JOB   BNCHMRK          PAGE   0000


BNCHMRK      FRTRN90      FILE NAME/TYPE   TESTIN/TEST4.F90
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      CREATION DATE/TIME   20-11-2025 14 10 38
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      FILE   001    PAGES   0002    LINES   000082
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      SYSTEM   LINUX 6.16.8+KALI-AMD64
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      SYSID   ACID     SYSUSER   ACID
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      FORM   SMALL
BNCHMRK      FRTRN90
BNCHMRK      FRTRN90      CHAR   FONT1403
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BNCHMRK      FRTRN90      PRT1403 VERSION   1.5.PRE-RELEASE


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*********  20-11-2025 14 10 38 ***********************************************************
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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
```

```
          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
```