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********************************************************************************
DATE   14-02-2025 16 35 05      USER   FRTRN90       JOB   BNCHMRK            PAGE   0000
```

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BNCHMRK    FRTRN90     FILE NAME/TYPE  TESTIN/TEST4.F90
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     CREATION DATE/TIME  14-02-2025 16 35 05
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     FILE  001   PAGES  0002   LINES  000082
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     SYSTEM  LINUX 6.11.2-AMD64
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     SYSID  ACID   SYSUSER  ACID
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     FORM  STANDARD
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     CHAR  FONT1403
BNCHMRK    FRTRN90
BNCHMRK    FRTRN90     PRT1403 VERSION  1.3
```

```
      FFFFFFFFF RRRRRRRR  TTTTTTTT  RRRRRRRR  N       NN  9999999    00000
      FFFFFFFFF RRRRRRRRR TTTTTTTT  RRRRRRRRR NN      NN 999999999  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
      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
```

```
      BBBBBBBB  N       NN  CCCCCCC  HH      HH M        M RRRRRRRR  KK     KK
      BBBBBBBBB NN      NN CCCCCCCCC HH      HH MM      MM RRRRRRRRR 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         HHHHHHHHH MM MMM MM RRRRRRRR KKKKK
      BBBBBBBB  NN  NN NN CC         HHHHHHHHH MM  M  MM RRRRRRR  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
      BBBBBBBBB NN      NN CCCCCCCCC 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     00   111
                        00     00 00     00    11
                        00     00 00     00    11
                        00     00 00     00    11
                        00     00 00     00    11
                        00     00 00     00    11
                         0000000   0000000   111111
                          00000     00000    111111
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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
```