```
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
```