```fortran
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!Assinment-8: Q6B - Kepler's 2 Body Problem

module ModGen
    implicit none
    real*8::G,mA,mB
end module ModGen

program Q6B
    use ModGen
    implicit none
    real::dt,t0,t1
    real*8::vxA0,vxA1,vyA0,vyA1,xA0,xA1,yA0,yA1
    real*8::vxB0,vxB1,vyB0,vyB1,xB0,xB1,yB0,yB1
    real*8::Axa0,Axb0,Aya0,Ayb0,Axa1,Axb1,Aya1,Ayb1

    open(1,file='Q6-Position-A.txt', status='unknown')
    open(2,file='Q6-Velocity-A.txt', status='unknown')
    open(3,file='Q6-Position-B.txt', status='unknown')
    open(4,file='Q6-Velocity-B.txt', status='unknown')

    !%%%%%%%%%%%%%%%%%%%%%% Initialzation %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%
    G=1.0d0         ! G=Universal Gravitational Cont
    dt=0.001          !increement
    t0=0.0          !intial time

    mA=1.0d0         ! mass of Object A
    xA0=0.5d0        ! x position of A
    yA0=0.0d0        ! y position of A
    vxA0=0.0d0       ! velocity in x direction of A
    vyA0=0.5d0       ! velocity in y direction of A

    mB=1.0d0         ! mass of Object B
    xB0=-0.5d0       ! x position of B
    yB0=0.0d0        ! y position of B
    vxB0=0.0d0       ! velocity in x direction of B
    vyB0=-0.5d0      ! velocity in y direction of B
    !%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%

    ! For A
    write(1,*) "#   t                   xA                         yA"
    write(1,*) t0,xA0,yA0
    write(2,*) "#   t                   vxA                        vyA"
    write(2,*) t0,vxA0,vyA0

    ! For B
    write(3,*) "#   t                  xB                          yB"
    write(3,*) t0,xB0,yB0
    write(4,*) "#   t                   vxB                        vyB"
    write(4,*) t0,vxB0,vyB0

    call acceleration(xA0,xB0,yA0,yB0,Axa0,Axb0,Aya0,Ayb0)

    do
        t1=t0+dt         ! time

        ! %%%%%%%%%%  Position calculation  %%%%%%%%%%%%
        ! ##########  Particle A  ###########
        xA1=xA0+(vxA0*dt)+(0.5d0*Axa0*dt**2)
        yA1=yA0+(vyA0*dt)+(0.5d0*Aya0*dt**2)
        ! ##########  Particle B  ###########
        xB1=xB0+(vxB0*dt)+(0.5d0*Axb0*dt**2)
        yB1=yB0+(vyB0*dt)+(0.5d0*Ayb0*dt**2)

        call acceleration(xA1,xB1,yA1,yB1,Axa1,Axb1,Aya1,Ayb1)
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```
68
69          ! %%%%%%%%%%  Velocity calculation  %%%%%%%%%%%
70          ! ##########  Particle A  ###########
71          vxA1=vxA0+(0.5d0*(Axa0+Axa1)*dt)
72          vyA1=vyA0+(0.5d0*(Aya0+Aya1)*dt)
73
74          ! ##########  Particle B  ###########
75          vxB1=vxB0+(0.5d0*(Axb0+Axb1)*dt)
76          vyB1=vyB0+(0.5d0*(Ayb0+Ayb1)*dt)
77
78
79          ! For A
80          write(1,*) t0,xA0,yA0
81          write(2,*) t0,vxA0,vyA0
82
83          ! For B
84          write(3,*) t0,xB0,yB0
85          write(4,*) t0,vxB0,vyB0
86
87
88          t0=t1
89
90          xA0=xA1
91          yA0=yA1
92          xB0=xB1
93          yB0=yB1
94
95          vxA0=vxA1
96          vyA0=vyA1
97          vxB0=vxB1
98          vyB0=vyB1
99
100         Axa0=Axa1
101         Axb0=Axb1
102         Aya0=Aya1
103         Ayb0=Ayb1
104
105         if (t1>2.5) exit
106     enddo
107 end program Q6B
108
109 subroutine acceleration(xA,xB,yA,yB,axA,axB,ayA,ayB)
110     use ModGen
111     real*8, intent(in) :: xA,xB,yA,yB
112     real*8, intent(out) :: axA,ayA,axB,ayB
113     real*8::rAB
114
115     rAB=sqrt(((xB-xA)**2)+(yB-yA)**2)
116
117     axA=-(G*mB*(xA-xB))/rAB**3
118     ayA=-(G*mB*(yA-yB))/rAB**3
119
120     axB=-(mA*axA)/mB
121     ayB=-(mA*ayA)/mB
122
123     return
124 end subroutine acceleration
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