```
subroutinef_main()
    usefdps_module
    useuser_defined_types
    implicitnone
    doubleprecision,parameter::time_end=10.0d0
    doubleprecision,parameter::dt=1.0d0/128.0d0
    integer::i,j,k,ierr
    integer::psys_num,dinfo_num,tree_num
    character(len=64)::tree_type
    doubleprecision::time_sys=0.0d0
    type(fdps_controller)::fdps_ctrl
    callfdps_ctrl%PS_Initialize()
    callfdps_ctrl%create_dinfo(dinfo_num)
    callfdps_ctrl%init_dinfo(dinfo_num)
    callfdps_ctrl%create_psys(psys_num,'full_particle')
    callfdps_ctrl%init_psys(psys_num)
    tree_type="Long,full_particle,full_particle,full_particle,Monopole"
    callfdps_ctrl%create_tree(tree_num,tree_type)
    callfdps_ctrl%init_tree(tree_num,0)
    callread_IC(fdps_ctrl,psys_num)
    callcalc_gravity(fdps_ctrl,psys_num,dinfo_num,tree_num)
    do
        callkick(fdps_ctrl,psys_num,0.5d0*dt)
        time_sys=time_sys+dt
        calldrift(fdps_ctrl,psys_num,dt)
        callcalc_gravity(fdps_ctrl,psys_num,dinfo_num,tree_num)
        callkick(fdps_ctrl,psys_num,0.5d0*dt)
        if(time_sys>=time_end)exit
    enddo
    callfdps_ctrl%PS_Finalize()
endsubroutinef_main

subroutinecalc_gravity(fdps_ctrl,psys_num,dinfo_num,tree_num)
    usefdps_module
    useuser_defined_types
    implicitnone
    type(fdps_controller),intent(IN)::fdps_ctrl
    integer,intent(IN)::psys_num,dinfo_num,tree_num
    type(c_funptr)::pfunc_ep_ep,pfunc_ep_sp
    callfdps_ctrl%decompose_domain_all(dinfo_num,psys_num)
    callfdps_ctrl%exchange_particle(psys_num,dinfo_num)
    pfunc_ep_ep=c_funloc(calc_gravity_pp)
    pfunc_ep_sp=c_funloc(calc_gravity_psp)
    callfdps_ctrl%calc_force_all_and_write_back(tree_num,&
                                                      pfunc_ep_ep,&
                                                      pfunc_ep_sp,&
                                                      psys_num,&
                                                      dinfo_num)
endsubroutinecalc_gravity

subroutinekick(fdps_ctrl,psys_num,dt)
    usefdps_vector
    usefdps_module
    useuser_defined_types
    implicitnone
    type(fdps_controller),intent(IN)::fdps_ctrl
    integer,intent(IN)::psys_num
    doubleprecision,intent(IN)::dt
    integer::i,nptcl_loc
    type(full_particle),dimension(:),pointer::ptcl
    nptcl_loc=fdps_ctrl%get_nptcl_loc(psys_num)
    callfdps_ctrl%get_psys_fptr(psys_num,ptcl)
    doi=1,nptcl_loc
        ptcl(i)%vel=ptcl(i)%vel+ptcl(i)%acc*dt
    enddo
    nullify(ptcl)
endsubroutinekick

subroutinedrift(fdps_ctrl,psys_num,dt)
    usefdps_vector
    usefdps_module
    useuser_defined_types
    implicitnone
    type(fdps_controller),intent(IN)::fdps_ctrl
    integer,intent(IN)::psys_num
    doubleprecision,intent(IN)::dt
    integer::i,nptcl_loc
    type(full_particle),dimension(:),pointer::ptcl
    nptcl_loc=fdps_ctrl%get_nptcl_loc(psys_num)
    callfdps_ctrl%get_psys_fptr(psys_num,ptcl)
    doi=1,nptcl_loc
        ptcl(i)%pos=ptcl(i)%pos+ptcl(i)%vel*dt
    enddo
    nullify(ptcl)
endsubroutinedrift

subroutineread_IC(fdps_ctrl,psys_num)
    usefdps_module
    useuser_defined_types
    implicitnone
    type(fdps_controller),intent(IN)::fdps_ctrl
    integer,intent(IN)::psys_num
    character(len=16),parameter::root_dir="input_data"
    character(len=16),parameter::file_prefix="proc"
    integer::i,myrank,nptcl_loc
    character(len=64)::fname,proc_num
    type(full_particle),dimension(:),pointer::ptcl
    myrank=fdps_ctrl%get_rank()
    write(proc_num,"(i5.5)")myrank
    fname=trim(root_dir)//"/"&
            //trim(file_prefix)//proc_num//".dat"
    open(unit=9,file=trim(fname),action='read',form='unformatted',&
           access='stream',status='old')
        read(9)nptcl_loc
        callfdps_ctrl%set_nptcl_loc(psys_num,nptcl_loc)
        callfdps_ctrl%get_psys_fptr(psys_num,ptcl)
        doi=1,nptcl_loc
            read(9)ptcl(i)%id,ptcl(i)%mass,ptcl(i)%eps,&
                    ptcl(i)%pos%x,ptcl(i)%pos%y,ptcl(i)%pos%z,&
                    ptcl(i)%vel%x,ptcl(i)%vel%y,ptcl(i)%vel%z
        enddo
    close(unit=9)
    nullify(ptcl)
endsubroutineread_IC
```