FORTRAN TIPS

- Do not try to save time by using short names for variables. *time* is better than t for a time variable. *Xcoord* is better than x. You may use short names for intermediate calculations:

```
x2    =  Xcoord(i)**2/25.
Force =  Velocity * (1. +x2 / (1.+x2) )
```

- Use "natural" names. t for a variable denoting a time-step could lead to a mistake. Use *dt* or *deltat*.
- Use the same name for the same variable in different subroutines. The following is an example of a bad style of programming:

```
.........
COMMON /A1/ x(n),y(n),z(n), mass(n)
CALL SUB1
......
SUBROUTINE SUB1
......
COMMON /A1/ U(n),B(n),V(n), x(n)
```

You should write:

```
SUBROUTINE SUB1
......
COMMON /A1/ x(n),y(n),z(n), mass(n)
```

- Do not use arrays, if you do not need them.
- Do not use variables, if you do not need them:
  Instead of:

```
Do i=1,N-1
   i1 = i + 1
   Do j =i1,N
      V(j) = j**2 + i1
   EndDo
EndDo
```

Write:

```
Do i=1,N-1
   Do j =i+1,N
      V(j) = j**2 + i+1
   EndDo
EndDo
```

- Do not abuse the previous rule.
- Try not to use labels. Instead of:

```
      Do 10 i=1,N-1
      Do 10 j=i+1,N
      V(j)=j**2 + i+1
10     CONTINUE
```

Write:

```
      Do i=1,N-1
      Do j=i+1,N
        V(j)=j**2 + i+1
      EndDo
      EndDo
```

- *If* is "cheap"
- Be carefull with integers:

  ```
  a = 1/3 * b
  ```

  gives *a =0.* You should write *a =1./3.*b*
- Do not write *a**(1./2.)* or *a**0.50* or even *a**2.*. Use *sqrt(a)* or *a**2* instead – it is 100 times faster.
- Instead of *a**0.25* use *sqrt(sqrt(a)).*
- Try to rewrite expressions to minimize the number of operations. Example: instead of

  $$y = a + b * x + c * x * *2 + d * x * *3 + e * x * *4$$

  (10 multiplications and 4 additions) use:

  $$y = a + x * (b + x * (c + x * (d + x * e)))$$

  (4 multiplications and 4 additions)
- It is very easy to make a mistake and it is very difficult to find a mistake in FORTRAN. Typos are especially hard. Read your code. Trace it step-by-step for a very simple problem.
- Use PARAMETER statement for constants.
- Write short and clear comments. In-line comments are especially handy:

  ```
  a = 1/3 * b      ! This is a comment
  c = 3.e+10       ! light velocity
  ```