DEVELOPING YOUR OWN MADAGASCAR PROGRAMS

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In this exercise you will complete the "geophysics" into a simple C and/or f90 program, and then compile and use it to run a sample calculation.

1. Building Your Program

(1) Take your copy of SCHOOL_CODE.tgz and do the following steps:
  - **mkdir $RSFSRC/user/yourname/**
  - **cp SCHOOL_CODE.tgz $RSFSRC/user/yourname/**
  - **cd $RSFSRC/user/yourname/**
  - **tar -xzvf SCHOOL_CODE.tgz**

(2) Check to see whether your compilers are working. Open your *Sconstruct* file with your favourite text editor (e.g., **vi SConstruct**) and see which programs are included in the *targets.c* and *targets.f90* blocks. This is where you list the names of your programs (in C and F90, respectively) to let Madagascar know which programs to compile. Program names must begin with an upper-case **M** for the **M**ain program. You see that there are C and F90 *helloworld* programs. Compile these by doing the following steps in your $RSFSRC/user/yourname/ directory:
  - **scons sfhelloworld_C**
  - **scons sfhelloworld_fortran**
  - Now test the C program out with: **./sfhelloworld_C**
  - Now test the F90 program out with: **./sfhelloworld_fortran**
  - How many cores does your computer have?

(3) You have a copy of an *almost finished* "vector addition" code in C and f90.
  - $RSFSRC/user/yourname/Mvectoradd_C.c
  - $RSFSRC/user/yourname/Mvectoradd_fortran.f90

Your assignment is to put the "geophysics" into one of the vector addition codes. Open the file in a text editor and complete the $\mathbf{C} = \mathbf{A} + \mathbf{B}$ assignment.
  - Hint: Vector index in F90 is A(); Vector index in C is A[].

(4) After completing this task build the code in the local directory by:
  - Type: **scons sfvectoradd_C**
  - Type: **scons sfvectoradd_fortran**

(5) You may (optionally) install the C or f90 program into $RSFROOT/bin/ by
  - Type: **cd $RSFSRC/ ; scons install**

2. Testing Your Program

(6) Go to your working directory (e.g. **cd /path/to/work/dir/**). You will have to make a *SConstruct* file and add the rules we need to test your *sfvectoradd_C* or *sfvectoradd_fortran* program.

(7) Create two random vectors, *A.rsf* and *B.rsf*, of the same length and add them together using a Madagascar program. There is more than one way to do this: Try searching **sfdoc -k math**

(8) Construct a *Flow* rule to obtain *C.rsf* from existing files *A.rsf* and *B.rsf* using your *sfvectoradd_C* or *sfvectoradd_fortran* program.

(9) Do you know that you got the correct answer? Let's test our program against a (correct) Madagascar program: *sfmath*. Write a final *Flow()* rule to do this.