PRACE Summer of HPC 2016

from 4 July 2016 to 31 August 2016
Jülich Supercomputing Centre (JSC)
CET timezone

Registration Form

1. Contact and Personal Information

Please complete the information below, filling in the text boxes or selecting from the drop down boxes where relevant.

Title -- Choose a value --

First Name(s) *

Surname(s) *

Address

City *

Country * -- Select a country --

Phone (+) 999 99 99 99

Email *

Gender * Male Female

Age (years) *

How old are you?

Curriculum Vitae * Choose File no file selected

Please provide your CV (in PDF if possible).

Nationality

Personal homepage

2. Your University/Institution

Please complete the information below, filling in the text boxes or selecting from the drop down boxes where relevant.

Institution name *

Institution address

City *

Country * -- Select a country --

Department

Undergraduate * -- Choose a value --

Please specify Programme below if your answer is NO

Programme

Course

Year

3. Motivation

Please explain your interest in HPC and PRACE and why you would like to participate in the Summer of HPC Programme (max 500 words).
The form can be expanded by dragging the lower-right hand corner.

4. Project selection

Please enter the project reference number for your preferred projects and explain why you selected these. See list http://summerofhpc.prace-ri.eu/projects-2016/. The project reference numbers can be found under each project description. Please state how you meet the prerequisites which can be found in the project description. You may repeat the procedure for up to 3 of your most preferred projects but the minimum is 2 projects. Please note that the preferred projects are not guaranteed to the successful applicants .

First Choice * -- Choose a value --

Please select the project reference title

First Choice: Why do you have a preference for this project?

Max 200 words

First Choice: How do you meet the prerequisites?

Max 100 words

Second Choice * -- Choose a value --

Please select the project reference title

Second Choice: Why do you have a preference for this project? *

Max 200 words

Second Choice: How do you meet the prerequisites?

Max 100 words

Third Choice -- Choose a value --

Please select the project reference title

Third Choice: Why do you have a preference for this project?

Max 200 words

Third Choice: How do you meet the prerequisites?

Max 100 words

Project ID

5. Social media

The Summer Of HPC program is centered around outreach and participants play a significant role in that. Blogging and the use of social media are a large part of the outreach aspect. What experiences in blogging, writing, and social media do you have that

can contribute to your participation in the outreach portion of the program?

Social media *

Max 300 words

6. Special Considerations

Please note: this section is optional. Please let us know if you have any special needs or requirements, which we can facilitate e.g. wheel-chair accessible accommodation etc. All information will be treated confidentially and will not be considered as part of the student selection process.

Optional

7. Please provide the contact details for your academic referee

Please give the contact details of an Academic Referee who may be contacted to give a statement in support of your application. PRACE Summer of HPC programme requires that you waive your rights to access information returned by referee! If the recommendation by referee is not returned timely (one week after invitation received) your application will be incomplete and consequently rejected.

Referee Title -- Choose a value --

Referee First Name *

Referee Surname *

Referee Email *

Referee Institution *

Referee Country -- Select a country --

Connection

Please describe how the reference knows you.

☐ Waiver *

By checking box you waive your rights to access recommendation.

8. Code Test

Below you will find a programming exercise that you must attempt and submit with your application. You may complete the exercise in C, C++, Fortran or Java. Code should be in plain text. We are keen to see how you approached each problem, even if you did not arrive at a full solution. Therefore please submit incomplete code rather than no code at all. Please flag areas that are incorrect or incomplete with comments.
NOTE, programming example can be solved in many many different ways, all of which are correct with huge differences in efficiencies between them.

Programming Exercise background

The following expansion gives an approximation to the exact value of π:

$$\pi(N)=\frac{4}{N}\sum_{i=1}^{N}\frac{1}{1+\left(\frac{i-\frac{1}{2}}{N}\right)^2}$$

For example, it is easy to check by hand that

$$\pi(1)=4\frac{4}{5}=3.2,\ \pi(2)=2\left(\frac{16}{17}+\frac{16}{25}\right)=3.162\ldots$$

It can be shown that the approximation continues to become more accurate as N is increased.

Exercises

Note that you must use double-precision variables for ALL floating-point numbers.

Exercise 1

Write a program in C, C++, Fortran or Java that computes an approximation to π using the above formula for the following values of N: 1, 2, 10, 50, 100, 500. For each value of N, print out the approximate value π(N) and the error err(N). The error is the difference between π(N) and the true value of π, ie err(N) = π(N) − π. As N increases the value of the error should decrease.

Source code for Exercise 1 Choose File no file selected

Screen Output for Exercise 1 (Even if you did not arrive to a full solution):

Exercise 2

We now want to find out the minimum value of N that is required to give a value for π(N) that is accurate to some specified value. We will call this value N_{min}. By computing π(N) for increasing values of N, calculate Nmin such that $err(N_{min}) < 10^{-6}$

Source code for Exercise 2 Choose File no file selected

Screen Output for Exercise 2 (Even if you did not arrive to a full solution):

Exercise 3

This way of computing Nmin is clearly inefficient. For example, if we require $err(N_{min}) < 10^{-6}$. and we calculate err(2) = 0.02, it is a waste of time to calculate err(3) as it is already obvious that N_{min} is very much larger than 2! Rewrite your program so that is uses a more efficient way to locate the minimum value of N. Your new method must produce exactly the same value for N_{min} as before but should be faster. For example, you might try and reduce the number of times that you have to evaluate err(N). You should also tell us how much faster your new program is.

Source code for Exercise 3 Choose File no file selected

Screen Output for Exercise 3 (Even if you did not arrive to a full solution):

Explain

Does the increase in speed vary depending on the accuracy that is required? If so, can you explain this variation?

Signature

By typing your name into the space provided, you certify that all the information entered in the form is accurate and true and that you are the author of the source code.

Signature

Remarks

Please note that all information will be treated as strictly confidential. By submitting this form you authorise PRACE to use your data for the purpose of the selection procedure of Summer of HPC and for follow-on correspondence. Eligible applicants will remain listed on the web page. Non eligible applicants will be notified and erased at the end of the summer.

*(All the fields marked with * are mandantory)*

Register


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