Frequently Asked Questions

Pks104-31-1.3_Challenge_GPU4EO_english_FAQ

What is?

GPU4EO 2015 is a challenge among researchers aimed at improving the performance of a processing software of remotely sensed data using the processing capacity of the GPU (*graphics processing unit*).

Who can subscribe at the challenge?

The challenge is open to teams composed by students/researchers belonging to research institutions and / or professionals.

Teams can be composed by:

- Researchers coming from research centers and / or students and professionals who operate outside of Puglia region;
- Researchers coming from public research centers operating in the territory of the Puglia region; Teams of students and / or professionals coming from Puglia or studying at the Universities of Puglia.

It is not allowed to a single person to participate in more than one team.

Which steps should I follow to subscribe at the challenge?

To participate the Challenge you must sign up through the website
www.planetek.it/eng/gpu4eo.

- The registered person will send at **gpu4eo@planetek.it** all the information about: the affiliation, the e-mail address and telephone to be used for communications.
- In case of participation of a team, with more than one participant, the registered person will communicate via e-mail, after the registration, the composition of the team directly to the organizing committee.

Registration and team information must be sent by **June 2, 2015.**
Any requests for clarification or support can be sent via e-mail at **gpu4eo@planetek.it**.

Who should I contact if I have questions to submit or I need support?

Any requests for clarification or support can be sent via e-mail at **gpu4eo@planetek.it**.

How can I access at ReCaS data center?

First of all, be sure your registration process is complete. Once registered, you'll stay in touch with the organizers, to receive all the information you need, including how to contact the ReCaS center. Any requests for clarification or support can be sent via e-mail at **gpu4eo@planetek.it**.

Are the technical information of ReCaS data center available?

Yes they are. After your registration process is complete, you'll keep in touch with the organizers to receive all the information needed. Any requests for clarification or support can be sent via e-mail at **gpu4eo@planetek.it**.

Who should I contact for technical support / questions?

- For questions about the installation and use of DORIS software contact: **Davide Oscar Nitti** davide.nitti@gapsrl.eu
- For questions about the access and use of the computational grid (BC2S) contact: **Giacinto Donvito** giacinto.donvito@ba.infn.it
- An internet forum and a mailinglist will be created to support the registered participants and answer all the technical questions.

Are there specific requirements for the execution of the activities?

Participants should download a copy of DORIS software from the web site http://doris.tudelft.nl/. All the information for the installation and configuration of the software are available on the same website.

Both **input data** (SAR interferometric pair and DEM of the area of interest) and expected **output data** (Differential interferogram and Coherence Map) will be made available to subscribers.

The developments will have to be optimized for **NVIDIA K40 GPU**.

A reference **hardware platform** will be made available to participants by ReCaS data center; it is based on the NVIDIA K40 board and will be exploitable for testing the developments and assessing the performance achieved.

By the end of activities, the teams who want to submit their applications for the evaluation must release the following outputs:

- the source code developed;
- the executable code for the reference platform;
- a report with the illustration of the activities carried out, including the description of the code portions that have been modified (max 2000 characters). Moreover, details must be provided concerning the identification of the source code and executable on the reference platform.

Which are the main dates of the initiative?

- **The subscription** is open from **April 1, 2015** until **June 2, 2015**.
- **Workshop: April 15** from 15.00 to 17.00 c/o Department of Physics - Campus of Bari and webinar.
- **Closing: June 15, 2015.** By this date the participants must send to gpu4eo@planetek.it the report of activities. With the closure of the activities will be inhibited access to the reference platform.
- **Award ceremony: June 25, 2015**.

Which criteria and evaluation process will be used for ranking my job?

The evaluation committee will draw up a ranking by running the instance provided by each participant on the reference platform and assessing the performances of the proposed developments. The benchmark will be executed on a data set different from the input provided to participants.

The evaluation criteria are:

- Execution time of the processing: 80 points.

  80 points will be awarded to the fastest processing chain whereas no points will be awarded to the slowest of all the participants.
  To score the intermediate values, a linear criterion will be adopted.
  0 points will be assigned to competitors that do not exceed the minimum performance requirement which is equal to a processing time reduction of 50%, taking as reference the processing time (on the same dataset) of the unmodified DORIS chain available on the reference platform.

- Quality of the result: 20 points.
  The quality of the results will be assessed by comparing the coherence map produced by each Team and the one generated by the unmodified DORIS chain available on the reference platform. 20 points will be awarded to the best coherence map (provided that it is even better than the reference coherence map) whereas no points will be awarded for interferometric coherence maps with a quality equal to (or slightly less than) the reference coherence map.

  To score the intermediate values, a linear criterion will be adopted.

  The teams that will present interferometric coherence maps with a quality significantly lower than the reference one will be excluded from the ranking. During the Challenge development period, each team will be enabled to perform coherence maps comparisons through a specific software module that will be delivered during the Workshop.

Will I maintain the ownership on my work?

The code implemented and provided by the participants acquires the same license of use of DORIS, as defined on the website http://doris.tudelft.nl/.
The ownership of the results belong to the entities that produced them, without prejudice to the possibility of organizers to use the results of the Challenge, also for marketing and communication.

What is the criteria to be defined as "Apulian" team?

If the team represents a research center or university, the operational center of the organization must be located in Apulia.

If the team is composed by a single persons, the majority of the team people must have his residence in Apulia or work in an Apulian research center or university

Who is the organizer of the event?

The "**Challenge GPU4EO**" is organized by **Planetek Italia srl**, as part of the Project "**RIESCO - Ricerca ImprESa COnoscenza: l'innovazione dal laboratorio all'impresa in Puglia**", which involves CNR, ENEA, INFN with the participation of Confindustria Puglia. Partners in the initiative are GAP LTD to support use of the software DORIS, INFN and the Department of Physics, University of Bari who have provided the reference platform in the datacenter RECAS.

You can contact the organizing team via e-mail at **gpu4eo@planetek.it**.

I have a suggestion. I found a way to improve (or a lack in) the rules of the Challenge. Can I communicate it to organizers?

Yes, this is something we absolutely encourage! You are very welcome, please contact us immediately at **gpu4eo@planetek.it**.

TECHNICAL QUESTIONS

What is, more in detail, the expected content of the final Report?

A preliminary analysis is welcome. The code and a description of the steps of the code. Which activities have been performed, starting from the profiling, and which software solution have been adopted.

Relating to the criteria used for ranking my job, how important is the quality of the results for the ranking?

The quality of the job is important. If the quality is under a fixed parameter (that will be soon communicated), the entire job will be not considered and excluded from the Challenge.

How many Core can be used?

One Core.

Which hardware is available, or it is possible to use. Is it possible to use multiple resources?

Only one Core and one K40 GPU.

If the subscribed teams are less than 8, each team will have his own machine to use. Otherwise, a system to guarantee all the teams enough time of access to the hardware resources available will be adopted.

Which version of DORIS software should we use?

- The reference version of DORIS software is the v. 4.02, downloadable at: http://doris.tudelft.nl/software/doris_v4.02.tar.gz
- The reference DORIS manual is downloadable here: http://doris.tudelft.nl/software/doris_v4.02.pdf
- For questions about the installation and use of DORIS software contact Davide Oscar Nitti davide.nitti@gapsrl.eu

Are the performances of DORIS software already known and which are the heaviest or most complicate steps of the processing?

Actually, is a part of participants' job to discover bottlenecks in the process. Is already known that the heaviest part is the coregistration.

Concerning the DORIS configuration files, are they fixed or can they be modified?

The DORIS configuration files will be provided to all the participants of the challenge. Since they will be used for computing, the performances of the standard DORIS implementation, they cannot be modified. On the contrary, the configuration files of the new implementation of the interferometric chain, specifically designed for GPU environment, could differ from the original ones. In fact, the participants are also allowed to propose alternative algorithms for specific interferometric tasks, that are totally different than those implemented in the original DORIS software.

About the development environment: which CUDA libraries must be used?

No limits for this. You can use the CUDA libraries made available by organizers or a different version available and chosen by you.

About the development environment: which OpenCV libraries must be used?

You choose which one. The only limit for this is that libraries must be Open source.

Is it allowed to use CMAKE for the installation of libraries?

Yes, we can provide CMAKE version needed.

Which precision is request for the job? int16, float32, float64?

No requirements for this. Participants should estimate the optimal precision in terms of performances and quality of results. DORIS, as default, works in single precision (for the most part of processes). Participant will estimate the impact of a lower precision (e.g. int16) on the final quality of the interferogram.

Concerning the input data provided to all the participants for the design and implementation of the interferometric chain in GPU environment, they will be also used for the final evaluation process?

No, a different SLC pair will be used by the evaluation committee for the final performance assessment.