

Consultation Meeting on Global Computing, Brussels 12/5/03.

Participants:

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Luca Cardelli	UK -Microsoft
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Summary:

This meeting was called as part of the consultation process for a follow-up action of the Global Computing initiative that most likely will be called in 2004. Two background documents were provided: the "First year milestone review of the GC proactive initiative" by David Pearce (1), and "Building the case for Global Computing" by the GC strategy group (2). These documents were provided for information only and were not discussed as such during the meeting, although some of the points addressed served as reference for the discussions.

The invited experts presented their own position and followed (or at least addressed some) the following directions given in the terms of reference that are included with the agenda:

- **Need:** Is a GC-II needed? What has been learned from GC-I? Can it become a more focused effort?
- **Place&Timeliness:** Where does a GC-II fit in relation with current efforts? (eg. GRID, Autonomic Computing, Trusted Computing, Nature-inspired and Complexity-based research..) Is it too late for this kind of "traditional CS" research?
- **Characteristics of the systems:** Is the definition of GC-like systems (<http://www.cordis.lu/ist/fetgc.htm#what>) too abstract for GC-II? Should it

include characteristics such as resource awareness and sharing, self-organising/healing properties, etc..?

- **Characteristics of the problems and solutions:** What are the new challenges to be tackled? Must scalability/security/resource&network awareness be at the core of the research called for? How to combine theory and real systems practice? Must the systems prototyping be an integral part of the research effort?
- **Focus:** What should be the research focus/foci of GC-II? What are the most promising lines of work that come from GC-I, but also what are the new lines? What could be expected as a result of GC-II in terms of technologies, solutions, etc.?
- **Implementation:** What are the right instruments to implement the initiative? What would be the ideal number/size/focus for Integrated Projects(IP)? Should IPs compete in approaches for the same goal, or map complementary areas? What would be the role of a Network of Excellence? What are the target research groups/communities?

The main points of the discussions that followed the presentation have been structured according to the above scheme for the sake of clarity of presentation:

Need:

It was agreed that an initiative with similar characteristics to GC is needed, as it is perceived positively both in terms of possible impact in current and future “global” architectures such as GRID, Web, Disappearing Computer-like, Ambient Intelligence, etc. and in terms of the nature and approach of the research. Currently GC is the only co-ordinated initiative at EU level with a specific Computer Science focus and aiming at long term foundational objectives in this area. It is also a key component in the FET global contribution to the AmI vision which complements naturally the other initiatives going in that direction such as Disappearing Computer and Presence.

Place&Timeliness:

As presented in (2), current efforts in GC stand as another “vertical” vision among the different vertical architectures like GRID, DC, etc. GC and in particular GC II should aim at taking a look at commonalties of the different vertical concepts in a rigorous, independent and global way, without losing grasp of the particular characteristics of current and future “global computers” or “global computing models” (the term “overlay computing” was challenged because of its “negative” connotations).

The distinguishing factor of GC with respect to other actions is, as pointed above, its long-term Computer Science approach and its exceedingly ambitious goal of providing theories, models and solutions that can be used and implemented in current and future global environments. Solutions in those environments will be provided by researchers and practitioners, but GC ensures a structured and rigorous approach in these solutions.

GC-II has already an ambitious goal ahead, which is to build foundations and provide common understandings and solutions that cut across these vertical visions, and this could be expressed in terms of a “grand challenge” for computer science. However, this must be further elaborated as current formulations are not clear (see below).

Characteristics of the problems and solutions:

A general agreement was present about the need to combine the theoretical and foundational work with real systems building practice in the GC-II projects (IPs), but there are still discussions about what will be the right balance of theory and practice that neither would stay at the toy example level nor would constitute a specific research effort centred in one particular model that could be done by the actions being carried out for the vertical visions (i.e. a new GRID advanced architecture). The need to take into account the specifics of the new computing infrastructures/architectures (i.e. GRID, Business processes languages, Trusted computing, Wireless ad-hoc proximity-based networks, P2P overlays etc.) was pointed out as a necessity for the success of the research action, and raised the question of the impossibility of finding a common integrating solution for these new architectures as they have different models of computation and different requirements (e.g. Security).

Also, the claim that GC (and future GC-II) will effectively help the construction of future systems brings in questions about the practical problems that a horizontal action will not be able to tackle, like middleware-specific issues, system configuration, integration and interoperability, usability and transfer of theoretical results, etc. that are common in the system practice. The need of multi-disciplinarity and the participation of users from outside the traditional CS community was raised but this was not discussed further.

Characteristics of the systems:

The discussions addressed the definition about “global computer”, “global computing” or even “overlay computer”, input has been received from Luca Cardelli. Resource awareness was raised as a key element in the “GC-II” systems, and simplicity was also singled out as a desirable characteristic.

There was also a contribution that pointed out the need for research efforts supported by FET not only at this high level tackled by GC, but also to go all the way down to low level architecture design in order to reduce the gap between these levels.

Focus:

There is a risk of GC-II being an unfocused effort if it wants to become a “horizontal” action, and it was suggested – as pointed out above – to ground it with the identification of concrete “vertical” architectures. The presentation of the horizontal vision of GC-II in (2) was considered by some participants as unclear and lacking focus. The question on how to define this focus of GC-II is still open, ranging from leaving it completely free for proposers to define and for evaluators to decide on it, or a more restrictive definition of research foci (supported by the Commission) that would be more natural for a follow-up effort.

From the discussions that followed Don Sannella's presentation (vertical visions/architectures, horizontal research topics), it is needed a clear characterisation of the systems/architectures and a good definition of the horizontal themes that can be combined to strike a good balance between abstraction/globality and practicality and usability of the solutions. It was suggested that a core definition for both axis should be highly desirable to provide focus to the Call.

Implementation:

The establishment of a NoE was regarded very positively. As IP are concerned, there were discussions about what kind and how to integrate multidisciplinary views and different communities (specially the theoretical and the systems oriented) with different understandings and goals. This point remains open.

Also, the examples of IPs in (2) were mentioned as possible examples for definitions of ideas for IPs, but the time available did not allow for discussions in depth.

Conclusions

- It is important to arrive at a clear understanding of the vision of GC-II, its goals (even the definition of its "grand challenge") and to characterize the kind of systems it will address and the research topics that should be tackled (the vertical and horizontal components).
- It is however more clear the approach that GC-II should adopt as a distinguishing characteristic, which should be a rigorous "integrated" Computer Science one, combining theory and practice in close partnership, although it could be perceived a divergence in this understanding between the more theoretical and the system oriented communities (for instance, in proposing languages vs. middleware as driving concepts to provide solutions).
- Further elaboration of the above ideas will take place in future working meetings.
- Comments to this Summary and contribution of the participants to the above points (e.g. an attempt to define the term "overlay computing") are expected in the following days.
- The point is taken that FET should consider actions in research reducing the gap between the high-level concepts dealt with GC and the low level compiler and architecture design.

References

- (1) "First year milestone review of the GC proactive initiative" by David Pearce
- (2) "Building the case for Global Computing" by the GC strategy group