

Deliverable D 7.4:

Access to a computer cluster

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EXECUTIVE SUMMARY

During the kick-off meeting and then from the feedback from the questioner all involved partners indicated that instead of installing a single computer cluster for mind step, they prefer to use the existing infrastructure of the partners and share when required the resources. This decision makes a provision of a new computer cluster unnecessary. All mind step partners involved in modelling have confirmed to have access to a high-performance computer framework in their institutions, which fulfil the requirements for modelling, and which enable the modelling groups to develop and test the foreseen deliverables.



1. BACKGROUND

Analytical modelling tools based on IDM units (machine learning based data mining or agent-based models) operate at a high spatial, but also temporal resolution. The underlying data are often georeferenced and require processing solutions that run near to the actual storage. In addition, parallel computing is required when models run at the single IDM and iterative, as example, when interacting with other models. For that reason, we develop an ICT solution, which opens the possibility to use High-Performance Computing Cluster. We will evaluate different software solutions, e.g. Spark, with respect to the coverage of supported modelling languages and with respect to scalability. The aim is to find a scalable processing power that serves WP3 and WP4 for developing and testing and allows the analysis of big data in WP2. We test and evaluate the possibility and resulting limitation (data confidentiality) to setup the toolbox in a cloud computing service, e.g. European Open Science Cloud.

2. FINDINGS FROM PARTNER SURVEY

We collected a list of data storage and processing capacities required by MIND STEP partners for their models in WP3 and WP4 in Del.7.3. For this an Excel file was provided to all partner in which the partners had to fill in their requirements with respect to the storage and processing capacities as well as the operating system. In particular we asked the partners to list three categories of requirements for their models: first, the hard disk storage (HDD) and memory (RAM) requirements; second, which and how many processors or graphic processing units they use; and third, which operating system and programming/statistical software are necessary to run their models. Deliverable 7.3 summarized the findings.

All modelling approaches, and particular those based on IDM units and hence involved in machine learning based data mining or agent-based models, operate at a high spatial and temporal resolution. The underlying data are often georeferenced and require processing solutions that run near to the actual storage. In addition, parallel computing is required when models run at the single IDM and iterative such as IFM-CAP, or as example, when interacting with other models.

During the kick-off meeting and then from the feedback from the questioner all involved partners indicated that instead of installing a single computer cluster for mind step, they prefer to use the existing infrastructure of the partners and share when required the resources. This decision makes a provision of a new computer cluster unnecessary. All mind step partners involved in modelling have confirmed to have access to a high-performance computer framework in their institutions, which fulfil the requirements for modelling, and which enable the modelling groups to develop and test the foreseen deliverables.

3. HPC AT WAGENINGEN UNIVERSITY (ANUNNA)

For teams that require High Performance Computer (HPC) services, but have no infrastructure at their disposal, the HPC cluster Anunna, hosted by Wageningen University & Research Centre (WUR), can be a viable option. It is open for use for all WUR research groups as well as other organizations, including



companies, that have collaborative projects with WUR. The current system contains 2000 cores, 4 GPU nodes, 1000 TB of parallel storage and a fast internal network. The cost range from 0.015 Euro per CPU core hour to 0.0015 Euro per GB memory hour, which would allow for a substantial amount of computing operations with the budget available for HPC services. The administrative settings, however, do not permit the costs of HPC use to be covered by a H2020 project budget. WU is currently working to get such costs eligible, so this may become an option in the future.

4. COMMERCIAL PROVIDERS

A further possibility to access HPC facilities by project partners are commercial providers of cloud computing facilities. There are positive experiences by project partners with Google cloud services. Generally, the partners have to ensure that they have the appropriate licenses if their applications require the use of proprietary software. A typical example is the General Algebraic Modelling System (GAMS), which is used for a variety of models in MIND STEP. GAMS offers also licensing solutions for cloud computing. The HPC cost are also within manageable ranges, e.g. an example on an Amazon cloud available at the GAMS homepage indicates 0.07 USD per hour (memory and CPU) for each model instance. Such commercial options offer a large degree of flexibility to accommodate the requirements of the partners and can well be the most preferable in terms of cost and administrative burden.

5. CONCLUSION

The partner survey indicated that there is sufficient computer hardware available at partner level. Should it be necessary to expand on existing hardware availability, the HPC at Wageningen University may become an available option once ongoing administrative changes will be implemented. Commercial providers like Google or Amazon are an alternative, for which project partners have already gathered positive experiences in past projects. Because of the general availability of HPC services and the currently sufficient in-house capacities at the MIND STEP partner organisations, there is no need for MIND STEP to invest in additional computer facilities.



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ANNEX I MIND STEP WP7 TEAM

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CONSORTIUM DESCRIPTION

The consortium of MIND STEP consists of 11 partners from 7 countries in Europe (the Netherlands, Germany, Austria (IIASA), Italy, France, Spain (JRC-Seville), Norway and Hungary). It includes partners from the private and public sector representing:

- Academia and higher education (UBO, UCSC, WU).
- SME dealing with research consultancy, data collection, strategic advice, normalization and policy in the field of energy, environment and sustainable development. This SME has also a strong track record in the field of communication, stakeholder engagement and exploitation (GEO)
- Public government bodies dealing with agricultural and environmental research and data collection and building agricultural models at different scales (WR, IIASA, IAMO, THUENEN, INRA, NIBIO, JRC)

The consortium has been carefully constructed in such a way that it is capable of jointly managing all activities and risks involved in all project stages. Each partner contributes its own particular skills, (inter) nationally wide network and expertise, and has a critical role in MIND STEP. Partner expertise smoothly complements each other and all together form the full set of capabilities necessary to lead MIND STEP to a success. Achieving the overall objective is determined by all partners in the consortium as well as their ability to involve other interested stakeholders in the process of developing, validating and disseminating the IDM models, indicators and methodologies (WR, UBO, IAMO, UCSC, WU, THUENEN and INRA) and linking IDM models to current agricultural policy models (WR, IIASA, UBO) included in the MIND STEP model toolbox. Dissemination and communication activities are steered by partner GEO who has graphic design, IT and marketing communication teams to deliver out-of-the-box and novel solutions for dissemination and communication and JRC who has a large network with policy makers. GEO has experience in leading comparable activities in H2020 projects as UNISECO and COASTAL. The coordinator WEcR is part of Stichting Wageningen Research (Wageningen Research Foundation, WR). WR consists of a number specialised institutes for applied research in the domain of healthy food and living environment. WR collaborates with Wageningen University (WU) under the external brand name Wageningen University & Research. One of the strengths of Wageningen University & Research (including WR) is that its structure facilitates and encourages close cooperation between different disciplines. The institutes Wageningen Economic Research (proposed coordinator of MIND STEP, WEcR) and Wageningen Environmental Research (WEnR) are involved in this proposal. The One-Wageningen approach will also be applied to MIND STEP. WEcR has a long standing reputation of leading large scale EU projects, such as SUPREMA, Foodsecure, SUSFANS, FLINT, SAT-BBE, and SIM4NEXUS.

