

subject areas A & B

Frankfurt/GSI

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subject area A

The idea of subject area A and the funding we applied for is the target oriented collective and multidisciplinary development of tools and structures in order to enable the integration, the efficient usage as well as the control of heterogeneous resources in the fields of application of Nuclear, Particle, and Astroparticle Physics.

The objective is here the comprehensive functionality of these tools and structures and therefore the achievement of largest possible synergies among the experiments.

Frankfurt/GSI contribution to area A

1 FTE in total (job hiring in progress) for
Area A: development of technologies for usage of heterogeneous resources

Standort	PI	FTE	Experiment	AP A1	AP A2	AP A3
KIT Süd	Quast	1,5	CMS	X	X	X
KIT Nord	Weber/Haungs	0,5	Auger	X		
Freiburg	Schumacher	1,5	ATLAS	X	X	X
München	Duckeck	0,5	ATLAS		X	X
Frankfurt FIAS	Lindenstruth	1	ALICE	X	X	
Wuppertal	Zeitnitz	0,5	ATLAS	X		X
Assoziiert						
Bonn	Bechtle	-	ATLAS	X		
DESY	Fuhrmann	-	CMS		X	
GSI	Schwarz	-	ALICE	X	X	

Area A:

Developments for the provision of technologies for the use of heterogeneous computing resources

A1:
tools for including heterogeneous resources into scientific computing workflows

A prototype for running Grid jobs in Singularity containers in HPC centres has been built. This prototype shall be intensively tested and improved in context with the ALICE T2 centre at GSI. After that it should be generalised to the use by other experiments and also at other HPC centres.

mile stones:

- M1 (06/19):
 - adapting the prototype to working with the Slurm scheduler at GSI
 - creating a management system for images
- M2 (06/20):
 - demonstrator of the prototype with another batch system (e.g. HTCondor) or at another HPC centre (e.g. GoetheHLR)
- M3 (06/21):
 - generalisation of the developed prototype to the use by other experiments (e.g. CMS)

Area A:

Developments for the provision of technologies for the use of heterogeneous computing resources

A2:

efficient usage of heterogeneous resources

A prototype of an XRootD based dynamic data cache for heterogeneous resources is being developed. A job which needs data from an external data server requests these data via an XRootD forward proxy. During this process the data are being cached on a local data cache. In case further jobs would require the same data set XRootD would recognise that the data are already locally available and would redirect these jobs via an XRootD Plug In to the local file system.

mile stones:

- M1 (12/18):
 - developing an XRootD based „disk cache on the fly“ following the concept described above
- M2 (12/19):
 - first prototype of the „disk cache on the fly“ at GoetheHLR

Area A:

Developments for the provision of technologies for the use of heterogeneous computing resources

A2:

efficient usage of heterogeneous resources

coordinated work plan among participating institutes has been created

common work packages:

- A2.1: development of XrootD based „disk caching on the fly“ on various platforms
- A2.2: benchmarking against other caching solutions, e.g. XCache
- A2.3: integration and test of XRootD caches in various centres for various experiments

common mile stones:

- G1 (Q2/20): comparison of different caching systems for finding optimal solution
- G2 (Q3/21): porting the optimal solution to other sites
- G3 (Q3/21): providing the optimal caching solution as open source product including documentation

subject area B

The idea of subject area B is to make use of the technologies developed in subject area A and to bundle and adjust them for various target systems.

Extensive tests under realistic conditions, e.g. reliability and scalability, are necessary.

For this especially the current Tier1/2 sites are important partners since here the necessary know how and the corresponding hardware for tests are available.

Frankfurt/GSI contribution to area B

0.5 FTE in total (job hiring in progress) for

Area B: application and test of virtualised software components in the environment of heterogenous computing resources

Standort	PI	FTE	Experiment	AP B1	AP B2	AP B3	AP B4
Aachen	Stahl	-	CMS				X
Bonn	Bechtle	1	ATLAS		X	X	X
Freiburg	Schumacher	0,5	ATLAS		X		X
Göttingen	Quadt	1	ATLAS				X
Frankfurt	Lindenstruth	0,5	ALICE	X			X
KIT	Quast	-	CMS/Auger	X	X		X
München	Kuhr	0,7	ATLAS/Belle II	X		X	X
Wuppertal	Zeitnitz	1	ATLAS	X		X	X
Assoziiert							
CERN	Elsing	-	ATLAS				X
DESY	Gülzow/Fuhrmann	-	-				X
GSI	Schwarz	-	ALICE				X
KIT/Gridka	Petzold	-	-				X

Area B:

Application and test of virtualised software components in the environment of heterogenous computing resources

B1:

tests of technology components

The Container (Singularity@Grid) and caching solutions („Disk Caching on the fly“) developed in the work packages A1 and A2 shall be tested intensively.

The solutions shall be installed on various platforms and be investigated with respect to simple installation procedures, scalability, performance and maintainability.

mile stones:

- M1 (12/19):
 - simple installation procedure including documentation for „disk caching on the fly“ (A2)
- M2 (06/20):
 - measurements of performance and scalability of „disk caching on the fly“ (A2)
 - comparision of direct remote WAN data access with access via local disk caching
- M3 (12/20):
 - simple installation procedure including documentation for Singularity environment for Grid jobs (A1)
- M4 (06/21):
 - support for start of operation of the solutions of A1 or A2 in at least one more centre for at least one more community.

Area B:

Application and test of virtualised software components in the environment of heterogenous computing resources

B4:

combined tests of technology components

The Container (Singularity@Grid) and caching solutions („Disk Caching on the fly“) developed in the work packages A1 and A2 shall be tested in combination.

mile stones:

- M1 (06/20):
 - testing Singularity based Container system (A1) at GoetheHLR
 - jobs should read data from „disk caching on the fly“ (A2) at GoetheHLR
 - performance measurements should be done
- M2 (06/21):
 - extending Singularity based Container system (A1) by an interface to HTCondor
 - dynamic HTCondor Cloud consisting of the centres GSI and GoetheHLR
 - jobs should run in Singularity Containers
 - jobs should read data either from Lustre@GSI or from „disk caching on the fly“ at GoetheHLR
 - performance measurements should be done