

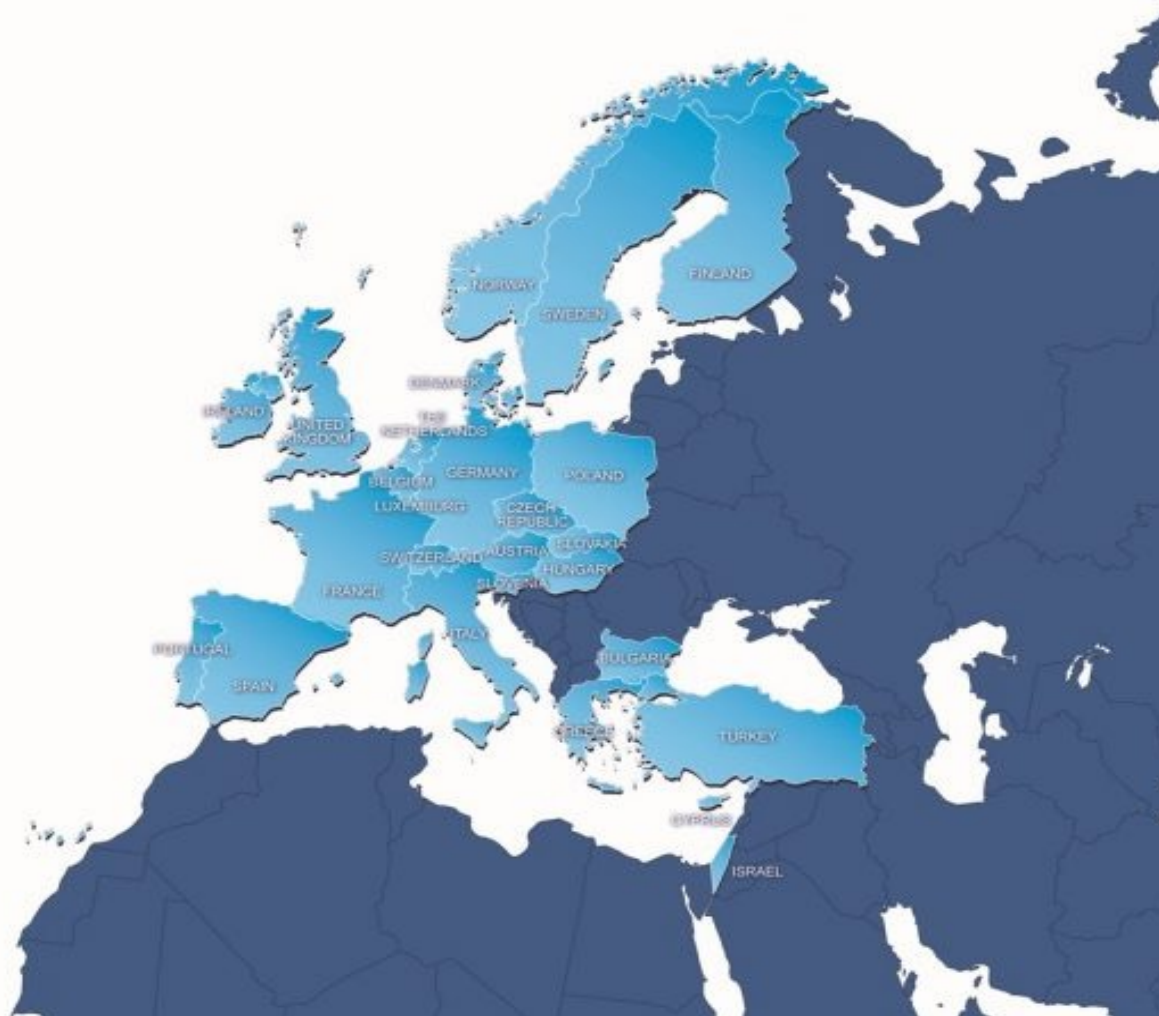


[www.prace-ri.eu](http://www.prace-ri.eu)



# PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE

## Partnership for Advanced Computing in Europe





# PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE

## SME HPC ADOPTION PROGRAMME IN EUROPE (SHAPE)

- KOBİ'lerin HPC ortamına adaptasyonunu sağlamak
- Endüstriyel çalışmalarda HPC farkındalığı oluşturmak ve rekabet ortamı yaratmak
- Başvurular yılda 2 kere açılır ve [shape-application\[at\]prace-ri.eu](mailto:shape-application@prace-ri.eu) üzerinden online olarak gerçekleştirilir.



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## Dünya ölçeğinde ve mimari çeşitlilikte 7 HPC Sistemi



Joliot-Curie, GENCI@CEA, France



JUWELS, GCS@FZJ, Germany



HAWK, GCS@HLRS, Germany



SuperMUC-NG, GCS@LRZ, Germany



MARCONI, CINECA, Italy



MareNostrum 4, BSC, Spain



Piz Daint, ETH Zurich/CSCS, Switzerland



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## Sistem Özellikleri ve Teknik Şartlar ( Tier 0 Tech-2017)

		<i>Curie</i>	<i>Hazel Hen</i>	<i>Juqueen</i>	<i>Marconi Broadwell</i>	<i>Marconi KNL</i>	<i>MareNostru m</i>	<i>Piz Daint</i>	<i>SuperMUC Phase 1</i>	<i>SuperMUC Phase 2</i>
Home file system	type	NFS	NFS	GPFS	GPFS	GPFS	GPFS	GPFS	NAS *	NAS *
	capacity	8 TB	60 TB	1.8 PB	200 TB	200 TB	59 TB	80 TB	10 PB	10 PB
Work file system	type	Lustre	Lustre	n.a.	GPFS	GPFS	GPFS	GPFS	GPFS *	GPFS *
	capacity	600 TB	12 PB	n.a.	7.1 PB	7.1 PB	612 TB	5.7 PB	12 PB	12 PB
Scratch file system	type	Lustre	n.a.	GPFS	GPFS	GPFS	GPFS	Lustre	GPFS *	GPFS *
	capacity	3.4 PB	n.a.	5.3 PB	2.5 PB	2.5 PB	1.1 PB	2.7 PB (to be upgraded with the system)	5.2 PB *	5.2 PB *
Archive	capacity	Unlimited	On demand	Unlimited	On demand	On demand	3.7 PB	NA	On demand	On demand
Minimum required job size	Nb of cores	1 024	2 048	2 048	540	2 040	1 024	1 024	512	512

\* SuperMUC Phase 1 and Phase 2 share the same file systems



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## Sistem Özellikleri ( Tier 0 Tech-2021)

		<i>HAWK</i>	<i>Joliot-Curie KNL</i>	<i>Joliot-Curie Rome</i>	<i>Joliot-Curie SKL</i>	<i>JUWELS Booster</i>	<i>JUWELS Cluster</i>	<i>Marconi100</i>	<i>Mare Nostrum 4</i>	<i>Piz Daint</i>	<i>SuperMUC-NG</i>
<b>System Type</b>		HPE	Bull Sequana	Bull Sequana	Bull Sequana	Bull Sequana	Bull Sequana	IBM Power 9 AC922 Whitespace	Lenovo	Hybrid Cray xC50	Lenovo ThinkSystem
<b>Compute</b>	Processor type	AMD Epyc Rome	Intel Knights Landing	AMD Epyc Rome	Intel Xeon Platinum 8168 2.7 GHz	AMD EPYC Rome	Intel Xeon Skylake Platinum 8168	2 * IBM POWER9 AC922 at 3.1 GHz per node	Intel Xeon Platinum 8160 2.1 GHz	Intel® Xeon® E5-2690 v3 @ 2.60GHz (12 cores)	Intel Skylake Xeon Platinum 8174
	Total nb of nodes	5 632	828	2 292	1 656	936	2 511	980	3 456	5 704	6 480
	Total nb of cores	720 896	52 992	293 376	79 488	44 928	120 528	31 360	165 888	68 448	311 040
	Nb of accelerators /node	n.a.	n.a.	n.a.	n.a.	4	n.a.	4 GPU per node	n.a.	1 GPU per node	n.a.
	Type of accelerator	n.a.	n.a.	n.a.	n.a.	NVIDIA® Ampere A100, 40 GB HBM2e	n.a.	NVIDIA® Volta® V100, Nvlink 2.0, 16GB	n.a.	NVIDIA® Tesla® P100 16GB	n.a.
<b>Memory</b>	Memory / Node	256 GB	96 GB DDR4 + 16 GB MCDRAM	256 GB	192 GB	512 GB	96 GB	256 GB DDR4 + up to 1.6 TB NVMe Memory per node	96 GB (200 nodes with 384GB)	64 GB	96 GB



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## Sistem Özellikleri ve Teknik Şartlar

System	Architecture	Site (Country)	Core Hours (node hours)	Minimum request (core hours)
<b>HAWK*</b>	HPE Apollo	GCS@HLRS (DE)	345.6 million (2.7 million)	100 million
<b>Joliot-Curie KNL</b>	BULL Sequana X1000	GENCI@CEA (FR)	37.5 million (0.6 million)	15 million
<b>Joliot-Curie Rome</b>	BULL Sequana XH2000	GENCI@CEA (FR)	195.3 million (1.5 million)	15 million
<b>Joliot-Curie SKL</b>	BULL Sequana X1000	GENCI@CEA (FR)	52.9 million (1.1 million)	15 million
<b>JUWELS Booster<sup>*1)</sup></b>	BULL Sequana XH2000	GCS@JSC (DE)	85.2 million (1.78 million)	7 million Use of GPUs
<b>JUWELS Cluster*</b>	BULL Sequana X1000	GCS@JSC (DE)	35.04 million (0.73 million)	35 million
<b>Marconi100<sup>2)</sup></b>	IBM Power 9 AC922 Whiterspoon	CINECA (IT)	165 million (0.47 million)	35 million Use of GPUs
<b>MareNostrum 4*</b>	Lenovo System	BSC (ES)	TBA	30 million
<b>Piz Daint<sup>3)</sup></b>	Cray XC50 System	ETH Zurich/CSCS (CH)	510 million (7.5 million)	68 million Use of GPUs
<b>SuperMUC-NG*</b>	Lenovo ThinkSystem	GCS@LRZ (DE)	91 million	35 million



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		<i>HAWK</i>	<i>Joliot-Curie</i>	<i>JUWELS</i>	<i>Marconi100</i>	<i>MareNostrum 4</i>	<i>Piz Daint</i>	<i>SuperMUC-NG</i>
<b>Home file system</b>	type	NFS	NFS	GPFS	GPFS	GPFS	GPFS	GPFS
	capacity	100 TB	0.5 TB	2.8 TB	200 TB	32 TB	160 TB	256 TB
<b>Work file system</b>	type	Lustre	Lustre	GPFS	GPFS	GPFS	GPFS	GPFS
	capacity	25 PB	9.2 PB	2.3 PB	3 PB	4.3 PB	6.3 PB	33 PB
<b>Scratch file system</b>	type	n.a.	Lustre	GPFS	GPFS	GPFS	Lustre	GPFS
	capacity	n.a.	5.2 PB	9.1 PB	2 PB	8.7 PB	8.8 PB	17 PB
<b>Archive</b>	capacity	On demand	On demand	On demand	On demand	n.a.	n.a.	On demand
<b>Minimum required job size</b>	Nb of cores	8 192 <sup>(*)</sup>	1 024		2 nodes	1024	6 nodes	960



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## Sistem Özellikleri ( Tier 1)

Partner	Country	Tier-1	Architecture - CPU - Accelerator	Rpeak (TFlop/s)
EPCC	UK	ARCHER2	Cray Shasta - AMD EPYC Zen2 (Rome) 64 core; 2.2 Ghz	TBA
BSC	Spain	Minotauro	Bull Bullx B505/R421-E4 - Intel Haswell E5-2630 v3; 8-core; 2.60GHz - Nvidia K80	250.9
SURF	Netherlands	Cartesius	Bull Bullx B720/B710 - Intel Haswell; 12-core; 2.6GHz + Intel Ivy Bridge; 12-core; 2.4GHz + Intel Sandy Bridge; 8-core; 2.7GHz	1,349.0
			Bull Bullx B515 - Intel Ivy Bridge 8 core; 2.5GHz - Nvidia K40	210.0
			Bull Sequana X1110 - Intel Broadwell 16 core; 2.6 GHz	236.0
			Bull Sequana X1210 - Intel Knights Landing 64 core; 1.3 GHz	48.0
		Snellius	Lenovo - AMD Rome 7H12@2.6GHz - Nvidia A100	CPU>1,500.0 GPU>1,500.0
PDC-KTH	Sweden	Beskow	Cray XC40 - Intel Haswell; 32-core; 2.3GHz	1,973.0



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PSNC- CYFRONET	Poland	Zeus BigMem	HP BL685c G7 AMD - AMD Interlagos; 16-core; 2.3GHz	61.2
		Prometheus	HP Apollo 8000 - Intel Xeon E5-2680 v3; 12-core; 2.5GHz	2,400.0
PSNC	Poland	Eagle	Intel Cluster - Intel Haswell E5-2697 v3; 14-core; 2.60GHz	1,380.0
PSNC - WCSS	Poland	Bem	Intel Cluster - Intel Xeon E5-2670 v3; 2x12-core; 2.30GHz	860.0
ICHEC	Ireland	Kay	Intel/Penguin Computing - Intel SkyLake Xeon 6148 CPU; 2x20- core; 2.4GHz	665.0
IT4I/VSB- TUO	Czech Republic	Salomon	SGI ICE-X - Intel Xeon E5-2680v3; 12-core; 2.5GHz - Intel PHI	2,000.0
KIFU	Hungary	Leo	HP SL250s - Intel Xeon E5-2650 v2; 2.60GHz - Nvidia K20, K40	254.0
		PHItagoras	HP SL250s - Intel Xeon E5-2680 v2; 2.80GHz - Intel/PHI 7120	27.0
GRNET	Greece	ARIS	IBM NeXtScale nx360 M4 - Intel(R) Xeon(R) CPU E5-2680 v2 @ 2.80GHz * 2	190.8
			Dell PowerEdge R820 - Intel(R) Xeon(R) CPU E5-4650 v2 @ 2.40GHz * 4	36.6



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			Dell PowerEdge R730 - Intel(R) Xeon(R) CPU E5-2660 v3 @ 2.60GHz * 2 - Nvidia Tesla K40m and Intel Xeon Phi 7120	244.3
			Supermicro SYS-4028GR-TVRT - Intel(R) Xeon(R) CPU E5-2698 v4 @ 2.20GHz * 2 - Nvidia Tesla V100-SXM2	63.1
CESGA	Spain	Finisterrae	Bull Bullx B505/R424-E4 - Intel Haswell 12-core E5-2680v3; 2.50GHz - NVIDIA K80	328.0
UL	Slovenia	HPCFS-U	Intel x64 HPE + Supermicro blades - Intel Xeon E5-2680V3 - NVIDIA Tesla K80	40.0
UHEM	Turkey	Sariyer	Intel x64 (Super Micro / Huawei / DELL) - Intel Xeon (E5-2680V3;2.50GHz, E5-2680V4;2.40GHz, Gold 6148; 2.40 GHz) - NVIDIA Tesla K20m	225.0
CSC	Finland	Puhti	Atos BullSequana X400 - Intel Xeon Gold 6230 - Nvidia V100	2,688.0
		Mahti	Atos BullSequana XH2000 - EPYC 7H12	7,060.0
UC-LCA	Portugal	Navigator	Fujitsu Primergy - Intel(R) Xeon(R) CPU E5-2697 v2 @ 2.70GHz+ Intel(R) Xeon(R) Gold 6148 CPU @ 2.40GHz+ Intel(R) Xeon(R) Gold 6154 CPU @	246.0



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CERN



Extreme Light Infrastructure



Square Kilometer Array (SKA)



## Hazırlık Erişim Türleri

**A Tipi Hazırlık Erişimi** ; maksimum kaynak kullanım süresi **2 ay**

**A Tipi:** Kod Ölçeklenebilirliği Testleri (Code scalability tests)

- Bu aşamada sunulan projenin açılacak çağrılardaki makinelere uygunluğu test edilir.
- A tipi projeler için maksimum kaynak kullanım süresi, nihai raporun teslim edilmesi dahil 2 aydır.



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**B Tipi Hazırlık Erişimi;** maksimum kaynak kullanım süresi **6 ay**

**B Tipi:** Kod Geliştirme ve Optimizasyon ( Eniyileme)

- ▶ Başvuru sahiplerinin projelerini (projede yer alacak insan kaynağı da dahil) detaylı bir plan dahilinde anlatmaları beklenir.
- ▶ B tipi projeler için maksimum kaynak kullanım süresi, final raporunun sunulması da dahil 6 aydır.



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**C Tipi Hazırlık Erişimi;** maksimum kaynak kullanım süresi **6 ay**

**C Tipi:** PRACE Uzmanlarının Desteğiyle Kod Geliştirme ve Optimizasyon (Eniyileme)

- ✧ B tipindeki süreç izlenir. Tek farkı C tipi başvurularında, kullanıcılar kod geliştirmek ve projelerini PRACE sistemlerine uygun hale getirmek için PRACE uzmanlarının desteğine başvurabilirler.
- ✧ Maksimum kaynak kullanım süresi, final raporunun sunulması dahil **6 aydır.**
- ✧ Destek personeli sayısı maksimum **6.**



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**D Tipi Hazırlık Erişimi;** maksimum kaynak kullanım süresi **12 ay**

**D Tipi:** Kod Uyarlama / Geliştirme ve Optimizasyon (Eniyileme)

- ▶ PRACE kullanıcılarına Tier-1 sistemlerinde kod geliştirme ve optimizasyon imkanı sunar.
- ▶ Tier-1 sistemlerinin yanı sıra Tier-0 sistemlerinde de ölçekleme testleri yapılır. Bu süreçte çalışmalar, PRACE uzmanlarının desteğiyle yürütülür.

**A,B,C ve D tipi proje başvurularında kullanıcılara verilecek destek miktarı makinelerin uygunluğuyla sınırlıdır.**



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## SAMPLE: SHAPE Call Application Form

This is a **SAMPLE** application form for the SHAPE (SME HPC Adoption Programme in Europe) call. Any text highlighted in yellow (like this paragraph) is there for guidance and **should be deleted** from the final application.

At this application stage some SMEs may not be in a position to provide all of the information requested e.g. specific hardware details, quantity of machine time etc. The review process can accommodate this, but where specific details are not available please provide as much relevant information as possible to assist in the assessments.

Project Title	A short title for your proposed project
Company Name	
Company Address	
Company Website	
Company Number	Registration number for your organisation
Number of Employees	An approximate range for the number of employees at the SME eg. 75-100
Contact Name	The employee/owner from the SME responsible for the application
Contact Position	Their position in the organisation
Contact Email	Their contact email address
Contact Phone	Their contact telephone number (please include international code) e.g. +44 (0) 7782 123456

**Has the company worked with PRACE before?**

If yes, please give details: project name, PRACE centre who they worked with, systems used etc

**What does the company do?**

(300 words) Please describe your company and its core expertise.

**Project Abstract**

(150 words) Briefly describe the project which you are proposing and its goals.



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## Industrial relevance and potential business impact

**(250 words)** A key criterion for approving a SHAPE application is that the project needs to have the potential to create business benefits for the proposing SME. Please provide some details of the business relevance and an estimate of the expected impact of the proposed work e.g. reduced time-to-market, job generation, increase in service quality etc.

## Proposed high-level Work Plan

**(300 words)** In general terms, please describe the planned approach to the project.

Where possible, provide a breakdown of the tasks required to achieve the project goals along with an estimate of effort for each task in person-months (PM) from both the SME and the PRACE expert. Include the total expected effort at the end (SHAPE projects typically receive 3-6 months of effort from PRACE). Note SHAPE projects are expected to produce a report (8-10 pages) on the work performed at the conclusion of the project.

An example workplan:

Start date:		The earliest date that the work can start. (It may be the case that the project will actually start some time after this date)		
Task	Title	Description	SME effort (PM)	PRACE effort (PM)
1	Initial Profiling	The software will be handed over to the PRACE partner and installed on the target system, along with example test cases and benchmarks. These will be verified and profiled to identify bottlenecks	0.5	1.0
2	Optimisation strategy	Based on profiling data from previous task, propose strategies for code optimisation	0	0.5
...			...	...
6	Final report	Produce report on the outcomes of the work	0.25	0.25
Total			3.0	5.0

## Technical and business requirements

Please identify technical and non-technical requirements for the project. **Please note that it is understood that not every SME will be able to complete this section.** However, **where it is available, provide as much information as possible** in the subsections below.

Technical requirements may include third-party software, preferred hardware architecture, non-standard security levels (like VPNs or data transfers methods not sftp-based), data storage estimates, remote visualization capabilities, etc... If there is a particular PRACE centre/HPC service that you wish to work with also please state this here.



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Non-technical requests may include Non-Disclosure Agreements, data locality issues, etc...

Please motivate your requests.

## Compute Resource

Existing architecture	Description of the type of architecture your code currently uses
Preferred architecture	General description of type of architecture you expect to access within SHAPE, or directly name a PRACE machine
Parallelisation strategy	List the parallelisation technologies required or already used (e.g. MPI, OpenMP, accelerator ...)
Storage (Gbyte)	Estimate of storage requirements for the project (include generated data as well as test cases etc)
Third party software	Any third party software required for the project: include name and version, webpage or similar, and the license conditions (e.g. open source)
Typical run	Description of requirements of the typical expected runs of the code e.g. 12 hours on 128 cores, 1 hour on 1024 cores.
Core hours	Estimate of total core-hours required for the project
Memory	Description of requirements of the maximum expected memory usage of the code e.g. 1GB per core, 10GB per node
	...
Other	Any further relevant technical details e.g. I/O estimates

Add notes here motivating the above requests

## Non-technical resource

Confidentiality	E.g. any NDA requirements
Other	Any further relevant non-technical details

Add notes here motivating the above requests



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TEŞEKKÜRLER..