

ComPat

Computing Patterns for High Performance
Multiscale Computing

www.compat-project.eu

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University Leiden



University College
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The Hartree Centre/STFC



Poznan Supercomputing and
Networking Centre



Allinea Software



Leibniz Supercomputing Centre



CBK Sci Con Limited



Max-Planck-Institut für
Plasmaphysik

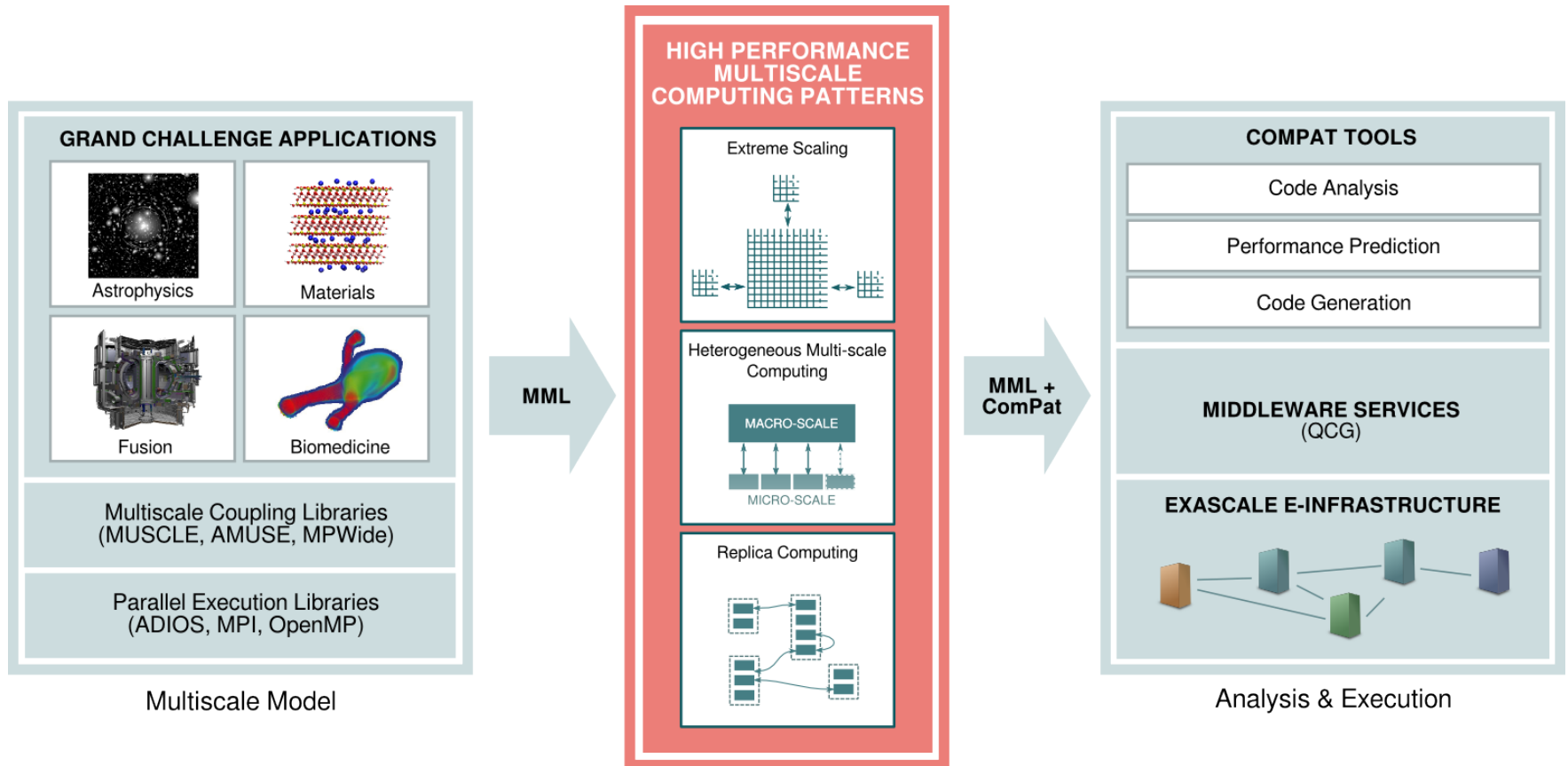


ITMO University



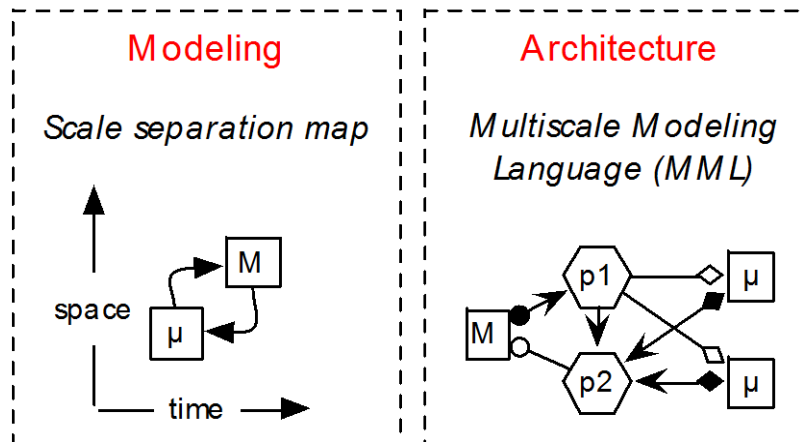
“**COMPAT** is a science driven project. The urgent need to push the science forward, and stay world leading in simulation driven science and engineering is our major motivation.”

High Performance Multiscale Computing

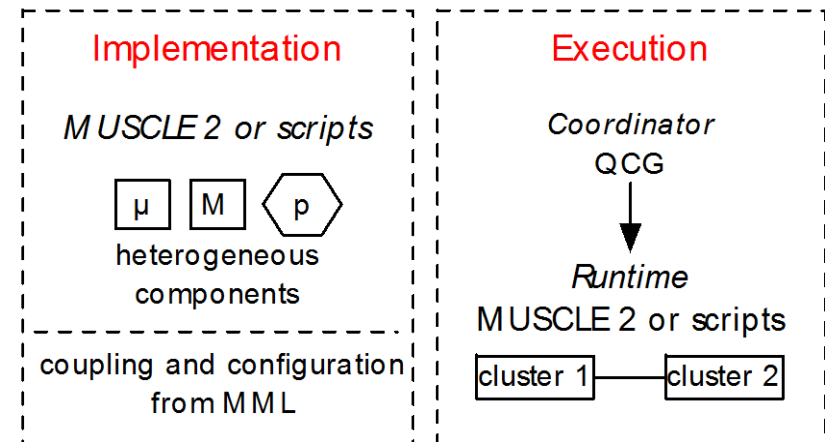


Multiscale modeling and simulation framework

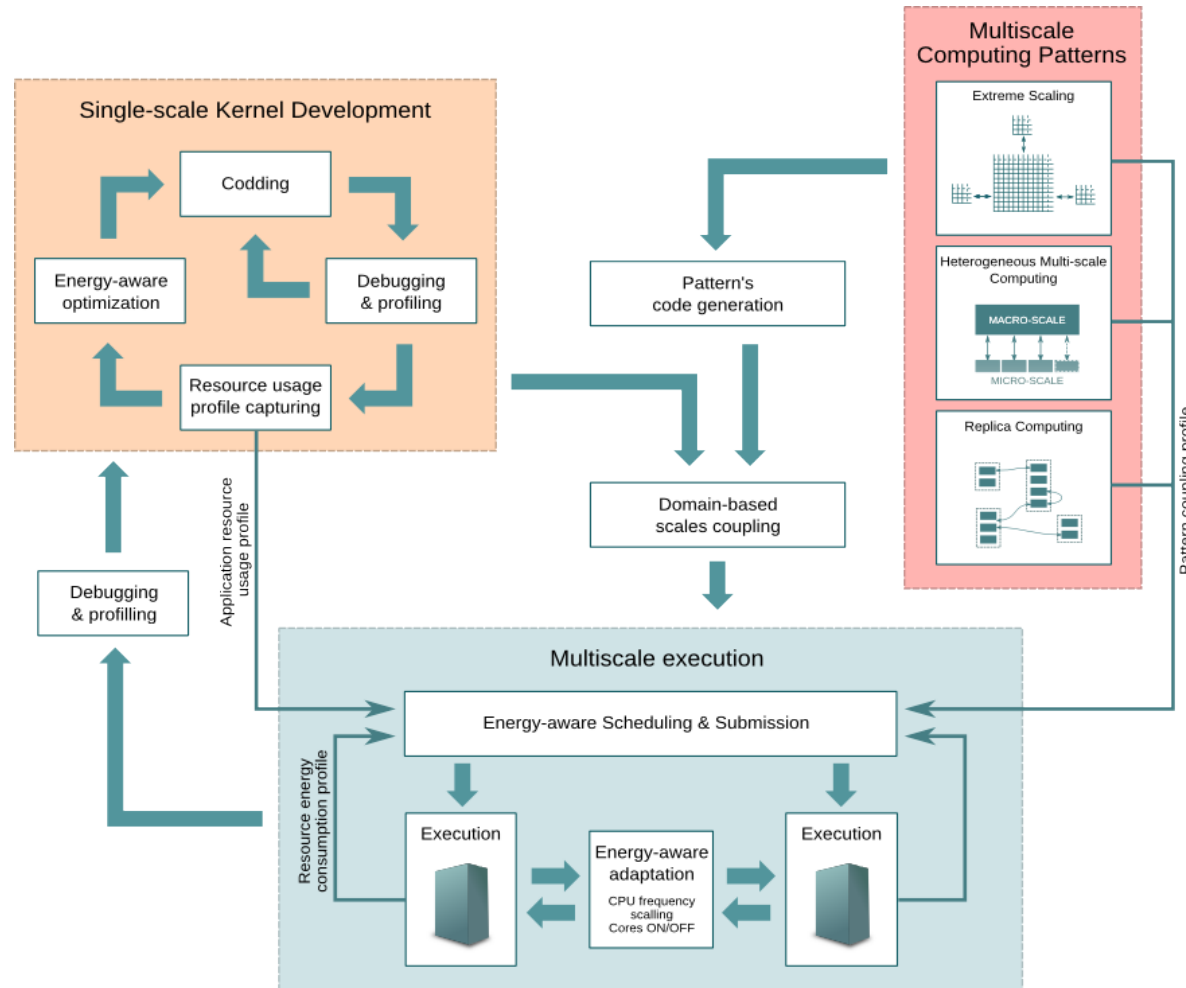
Conceptual Framework



Computational Framework



Multiscale software development cycle

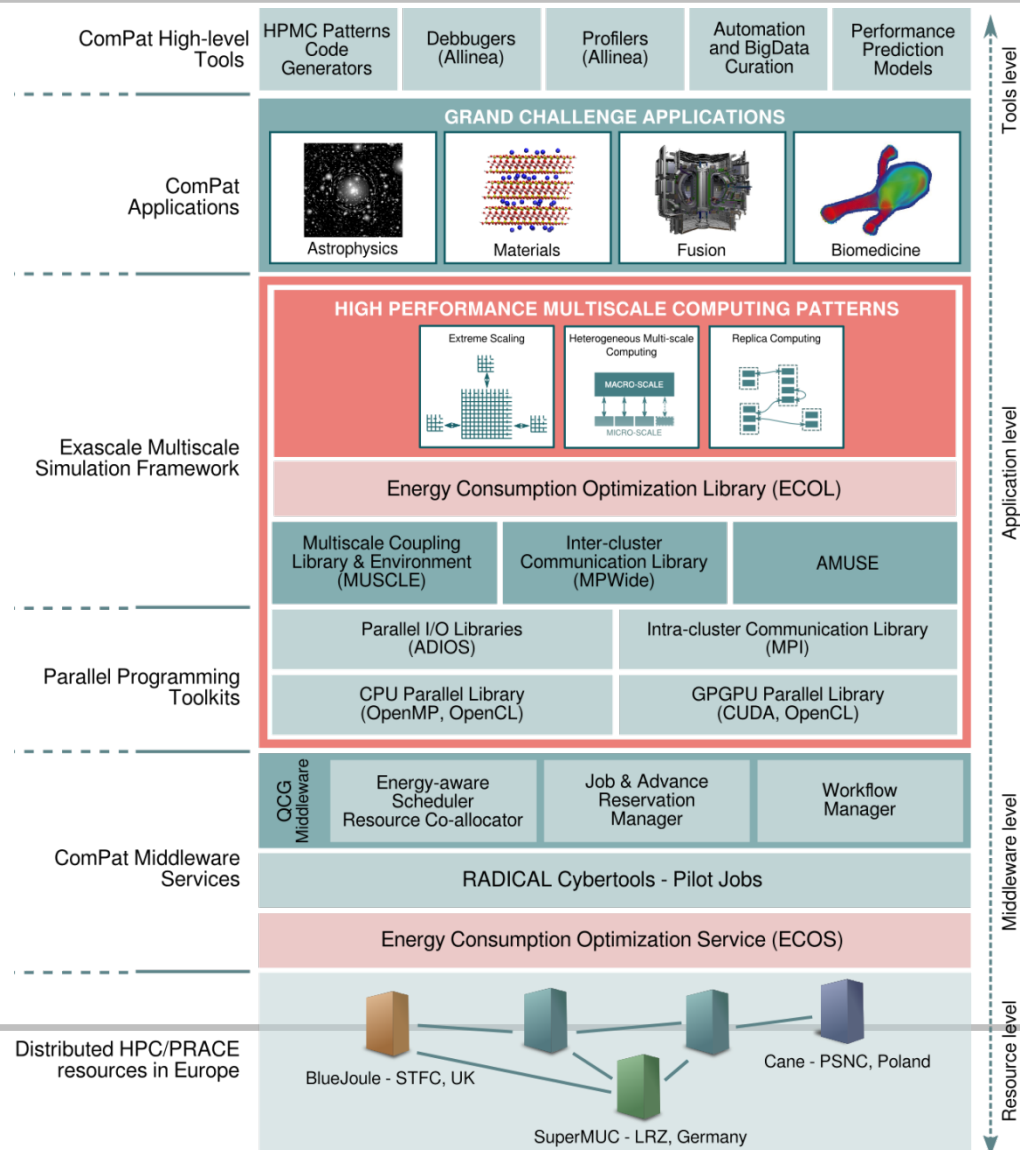


Applications details

	Extreme Scaling	Heterogeneous Multiscale Computing	Replica Computing
Fusion (MPG-IPP)	global turbulence simulation	flux-tube chain	-
Biomedicine (UvA)	RBC and platelet transport	blood rheology	-
Biomedicine (IMTO + UvA)	In-stent restenosis	-	In-stent restenosis (*)
Biomedicine (UCL)	aneurysm flow dynamics	aneurysm flow dynamics(*)	
Material Science (UCL)		“on-the-fly” coarse-graining	phase behaviour (*)
Astrophysics (UL)	Milky-Way Galaxy simulation	Milky-Way Galaxy simulation (*)	-

	Core count (state-of-the-art)	Core count (desired)
Extreme Scaling		
Fusion (MPG-IPP)	400,000	4,000,000
Biomedicine (UvA)	45,000	4,000,000
Biomedicine (ITMO + UvA)	4,000	4,000,000
Biomedicine (UCL)	49,000	600,000
Astrophysics (UL)	500,000	10,000,000
Heterogeneous Multiscale Computing		
Fusion (MPG-IPP)	16,000	120,000
Biomedicine (UvA)	45,000	4,000,000
Biomedicine (UCL)	49,000	750,000
Material Science (UCL)	294,000	2,000,000
Astrophysics (UL)	1,000	100,000
Replica Computing		
Biomedicine (ITMO + UvA)	4,000	400,000
Material Science (UCL)	294,000	3,000,000

ComPat stack



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