

The background is a light blue and white abstract composition. It features a perspective view of a digital space with binary code (0s and 1s) arranged in a grid that recedes into the distance. Overlaid on this are various geometric shapes, including rectangles and hexagons, some of which are outlined in blue. There are also some blue dots and lines scattered throughout, giving it a sense of depth and digital connectivity.

PEPR NumPEX Exa-MA Software analysis

Exa-MA

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Chapter 1. Introduction

Chapter 2. Doe Software Analysis

This section describes the software analysis for the DOE Stack for the Exa-MA project.

Chapter 3. Solver Libraries

Table 1. Likelihood-Impact Matrix for Solver Libraries

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High		Hypre	Trilinos	
Medium		PETSc, STRUMPACK, SuperLU	PARDISO, SPARSKIT, SparsePACK	KokkosKernels
Low		BLAS, LAPACK	SuperLU-Dist	

Chapter 4. Math, Meshing, Discretization & Decomposition

Table 2. Likelihood-Impact Matrix for Math, Meshing, Discretization & Decomposition

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High		MFEM		libigl
Medium		METIS, ParMETIS		
Low		SAMRAI		STK, UMR, Portage, Tangram, Axom, Overlink, Sculpt

Chapter 5. Compilers, Runtimes and Languages

Table 3. Likelihood-Impact Matrix for Compilers, Runtimes and Languages

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High		PyKokkos, Python, TensorFlow		
Medium	C++, GCC	MPICH, OpenMPI, Fortran, MPI, HIP, CUDA, OpenMP, PyTorch, Boost, Intel MPI		Kokkos, C
Low	RAJA Suite	Flang, Intel Compiler Suite, LLVM	FleCSI, KokkosRemoteMemorySpaces, Perl	Legion

Chapter 6. System imaging, system monitoring and management

Table 4. Likelihood-Impact Matrix for System imaging, system monitoring and management

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High			CharlieCloud	
Medium		LSF		LDMS, Flux, SICM, AppSysFusion, GMI, Maestro/Merlin, Splunk, VmWare
Low		SLURM		

Chapter 7. Visualisation And Analysis

Table 5. Likelihood-Impact Matrix for Visualisation And Analysis

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High		Visit, Conduit	Catalyst	Cinema, Ascent
Medium		VTK/VTKm, Paraview		
Low				

Chapter 8. Build, Development and Software Eng.

Table 6. Likelihood-Impact Matrix for Build, Development and Software Eng.

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High	git, git-lfs	Spack		
Medium	CMake, gdb	Autoconf/Automake, Gitlab, Valgrind, Caliper		Archer, PAPI, KokkosTools, CDash, STAT
Low	Ninja	BLT, TotalView	AllineaForge	

Chapter 9. IO Storage/Data management

Table 7. Likelihood-Impact Matrix for IO Storage/Data management

Likelihood \ Impact	Very High	High	Medium	Low
Very High				
High				
Medium	HDF5/Parallel-HDF5	NetCDF, pNetCDF, SEACAS, HPSS, MarFS, SILO, Exodus, yamlcpp, ADIOS, szip/AEC		UnifyFS, ZFP, GUFU, HIO, SCR, Sina/Kosh, CGNS, libz, DB2, Matio
Low				