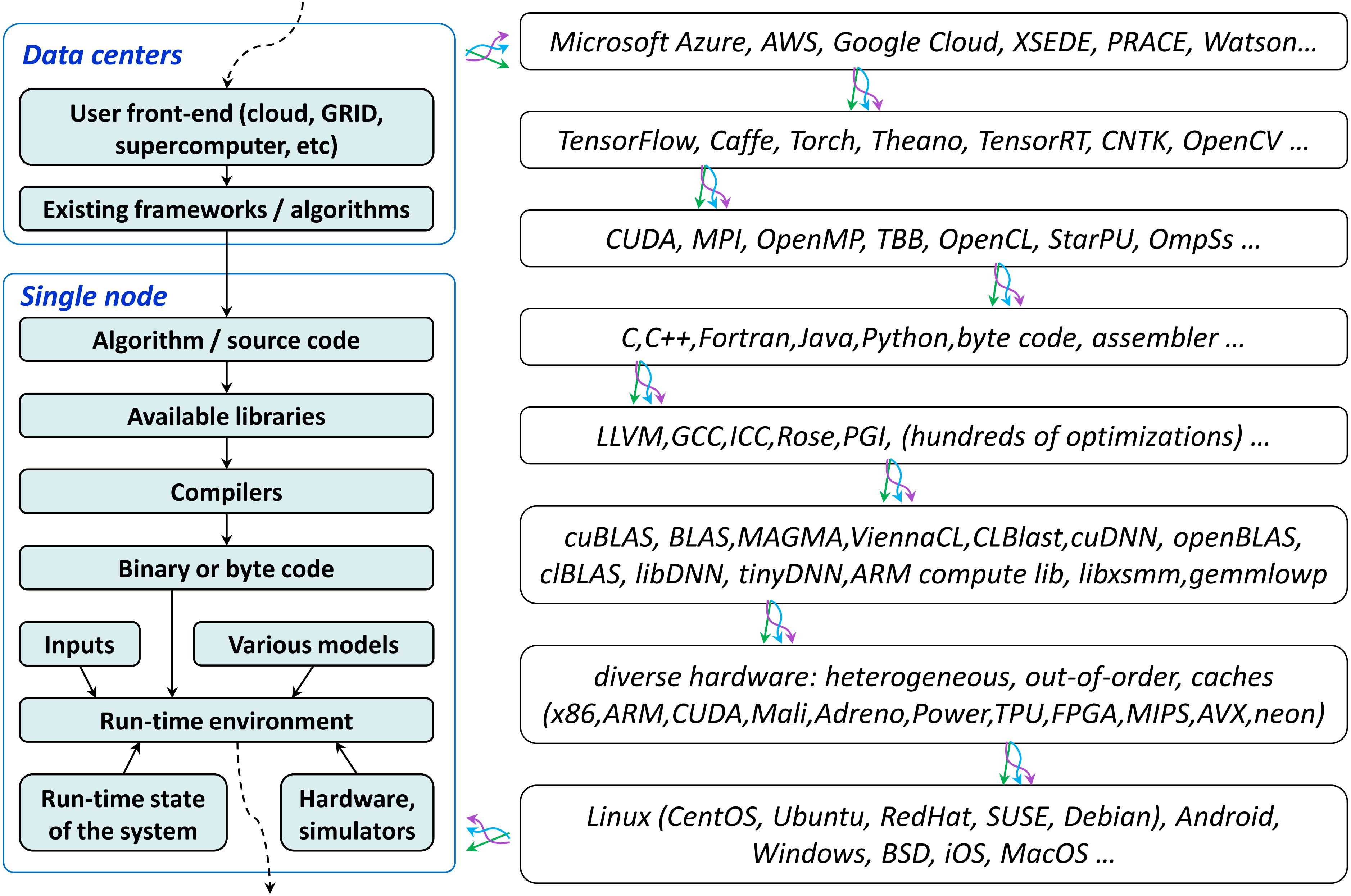
Diverse SW must be optimized for diverse HW from IoT and supercomputers



Data centers

User front-end (cloud, GRID, supercomputer, etc)

Existing frameworks / algorithms

Single node

Algorithm / source code

Available libraries

Compilers

Binary or byte code

Inputs

Various models

Run-time environment

Run-time state of the system

Hardware, simulators

Microsoft Azure, AWS, Google Cloud, XSEDE, PRACE, Watson…

TensorFlow, Caffe, Torch, Theano, TensorRT, CNTK, OpenCV …

CUDA, MPI, OpenMP, TBB, OpenCL, StarPU, OmpSs …

C,C++,Fortran,Java,Python,byte code, assembler …

LLVM,GCC,ICC,Rose,PGI, (hundreds of optimizations) …

cuBLAS, BLAS,MAGMA,ViennaCL,CLBlast,cuDNN, openBLAS, clBLAS, libDNN, tinyDNN,ARM compute lib, libxsmm,gemmlowp

diverse hardware: heterogeneous, out-of-order, caches (x86,ARM,CUDA,Mali,Adreno,Power,TPU,FPGA,MIPS,AVX,neon)

Linux (CentOS, Ubuntu, RedHat, SUSE, Debian), Android, Windows, BSD, iOS, MacOS …

Users need efficient solutions to balance speed, accuracy, energy, resource usage and other costs