LLVM for Interactive Modeling and High Performance Simulation

An Example of Interactive Modeling

Shared Library-Based Simulation

- High cost interactive modeling due to shared library related disk IO
- Locally Optimized execution code because loss of equation and IR information prevents global model optimizations

Multi-Thread LLVM-Based Simulation

- Low cost interactive modeling because there is no disk IO in compilation
- Globally optimized execution code due to global model optimizations in both the model equations and the LLVM IR

Results

- LLVM-based JIT in production code
- Consistent floating point numerical computation
- Support multiple threads on 64bit Linux, 32bit and 64bit Windows, 64bit Intel Mac

Challenges

- Shared library support
- Faster JIT performance
- Propagate through JIT code the exception thrown from the external functions
- MCJIT transition

---

MathWorks

Peng Cheng  Nathan Brewton  Dale Martin