Insights From PASC / StructBehavioral Conference

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It Doesn’t Have To Be Painful

- “Philipp, you are missing one aspect: where is the pain?” (John Kennan, yesterday at Alter Zoll)
- At PASC, people were open for painless solutions
  - Python vs. Fortran
  - Readable vs. absolutely fastest code
  - Minimizing development time
  - People love estimagic!
- BTW: We could convince John that writing respy is painful enough and that there is good and bad pain

It’s All About Smart Algorithms

- Economists often think its about
  - a fast language
  - using large machines
- HPC Experts seem to look at the following
  - Having “good enough” solution
  - Saving calculations
  - Smart algorithms

An Impressive Paper

- Sam Hatfield, Doctoral Student in Oxford
- Current state of whether models
  - World = Grid of 9 x 9 km squares
  - Model has to run once per hour
  - Goal: Grid of 1 x 1 km squares
  - Observation: Most time spent in spectral transformations
- Idea: reduce numerical precision

An Impressive Paper

- Approach 1: Use 16 bit float
- Approach 2: Use mixed precision (16 and 32 bits) with Nvidia Tensor Cores
- Approach 3: Use higher precision where it matters
- 2 and 3 are precise enough and lead to more than 50 % speed-up

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- Who sees a useful application?

Write Future Proof Code

- Computers become more heterogeneous:
  - CPUs, GPUs, FPGAs, ARM Processors, . . .
- Meteorologists rewrote a lot of code:
  - Frontend written by scientist
  - Backend written by computer scientists
- Seems like physicists are not there yet

How Do We Write Future Proof Code?

- Rely popular existing libraries as much as possible
- Future technologies will provide drop in replacements
  - cudf, dask, . . .
- Use llvm based compilers (numba!)
- Don’t micro-optimize

New Initiatives

- Chris Carroll wants to extend HARK
- Money is not an issue
- Biggest challenge: Finding good developers
- This is your chance!
- He might join the next hackathon