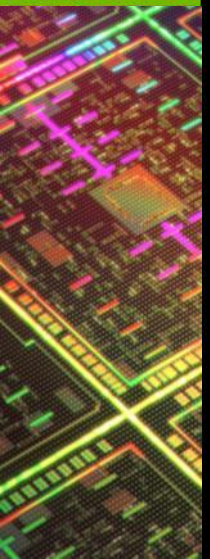
GPUs in Energy Exploration: Software Development & Deployment

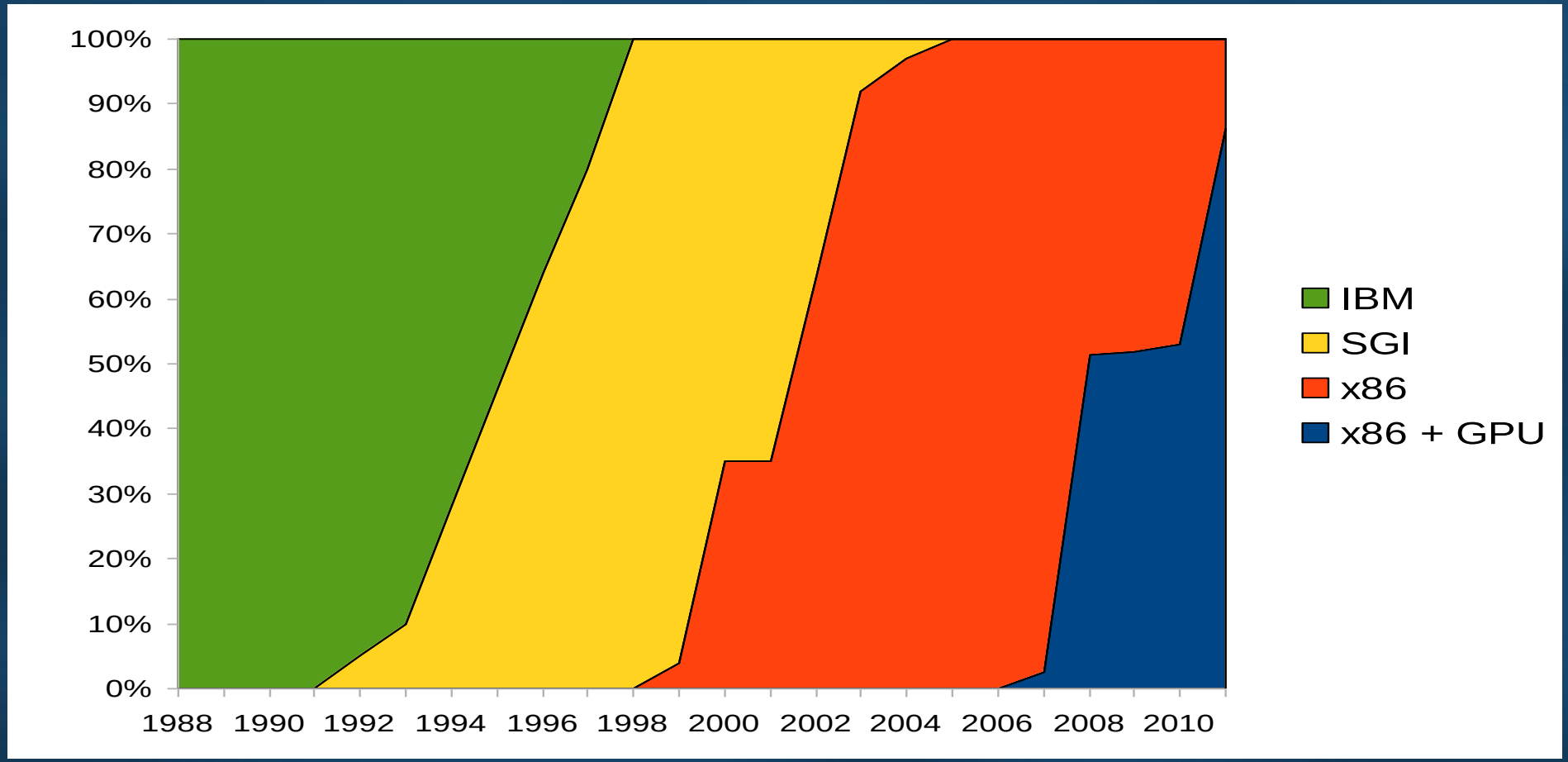
GPU TECHNOLOGY CONFERENCE

Panel: GPUs in Energy Exploration Software Development & Deployment

Dave Nichols	Alex Loddoch	Paulo Souza	Mauricio Araya	Bob Clapp	Paulius Micikevicius
Schlumberger	Chevron	Petrobras	Repsol	Stanford	NVIDIA



Petrobras Processing Power Distribution



PETROBRAS

GPU programming

- ILP – Instruction level parallelism;
- Overlap kernel execution with memory copies and communication;
- Textures to minimize data size;
- Recompute instead of load from memory / filesystem;
- CPU cooperation;
- Multi GPU – MPI layer: IB or P2P under;

Petrobras Imaging on GPUs

- **Five GPU clusters**: Three for production and two for research

- Data Regularization – RMIL (Regularization by local isochrones migration)

- Kirchhoff Time Migration and Velocity Analysis
- Curved Ray / Anisotropy

- Kirchhoff Depth Migration

- One Way Wave Equation Migration

- Reverse Time Migration