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6.189 Multicore Programming Primer, January (IAP) 2007

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6.189 IAP 2007

Project Ideas

Project Ideas From Many Domains

- Gaming engines
- Media applications
- Algorithms for molecular dynamics
- Protein folding challenge problems

Project Ideas

- New feature rich games or applications
 - Exploit available resources for new effects or features
 - Multimedia feature extraction and indexing
- Simulation of molecular dynamics
 - For drug discovery, protein folding
- Security applications
 - Feature detection (face recognition), pattern matching (network intrusion detection, gene discovery)
- Monte Carlo simulations
 - Medical imaging to recognize abnormal tissues
 - Oil field analysis to find oil rich wells
 - Models for financial markets to maximize profits
- Algorithms that exploit SIMD properties of SPEs

More Project Ideas

- Black-Scholes PDE solver
- Chess
- Face and voice recognition
- JPEG or MPEG encoding
- Linear algebra libraries
- Multi-pattern string matching
- Neural network simulation
- Viterbi algorithm applied to bioinformatics

Examples of Project Scope

- Can take existing algorithms and re-implement them in a parallel or SIMD equivalent
 - Pattern matching for security applications
- Can take existing applications and modify them for the PS3 adding new capabilities
 - Add new features to the Quake 3 game engine
- Design and implement a new project from scratch that harnesses the power of the Cell and PS3

Project Support

- Direct access to PS3 hardware
- Direct access to Tools from Sony and IBM
 - Compilers, tutorials, example codes
- Projects can be implemented in
 - C using threads and Cell intrinsic instructions for direct access to the bare metal
 - StreamIt and StreamIt virtual machine which hides the bare metal and provides a rich programming interface
 - Other approaches are also possible (e.g., OpenMP or MPI)