Multigrain Parallelization

- Exploitation of Multi-level Parallelism
  - Coarse-grain Parallelism
  - Subroutine, Loop, Basic Block
  - Fine-grain Parallelism
  - Loop-Level Parallelism

OSCAR Compiler Generates Hierarchically-Clustered Macro-Tasks (MT)

- Macro-Tasks (MT)
  - Subroutine Block (SB)
  - Basic Block (BB)
  - Loop Block (RB)

- Macro-Task Graph (MTG)
  - Task Graph considering Control-Flow, Data-Dependency

Details about simulation

- Evaluated Application: MP3 Encoder
- OSCAR Heterogeneous Multicore

Performance on an OSCAR Heterogeneous Multicore

- Pentium 4
- SH4A, GE-GA (DRP)
- LDM: 1 cycle
- DSM: 1 cycle (loop), 4 cycles (remote)
- 32 KB, 32 KB, 1 cycle
- Power Dissipation: 150 mW, 210 mW (300 MHz, 1.25 V, 300 nm process)

- Compiler achieves low power dissipation by controlling appropriate F/V state for each MT

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Future Work

- Applying our method to real -chip