Programming Models and Operating Systems: View from FORTH

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Topics

- Locality management in many-core programming models and OS
  - machine-independent locality constructs
  - runtime, OS, and compiler support for locality management
  - Explicit versus implicit parallelism and locality management
  - hardware/software interface for locality management
    - interaction with RDMA mechanisms, coherence protocols, see work on multi-core architectures
- Fine-grain and multiple-grain parallelism exploitation in many-core programming models and OS
  - Models of parallel computation
  - Single abstraction of layered and hybrid parallelism
  - Common runtime environment for dynamic parallelization

Topics

- Virtualization
  - Application-specific system software customization
  - Spatial decomposition of software components
- Power and thermal adaptation
  - Concurrency throttling
  - Multi-dimensional performance predictors
  - Statistical and machine learning performance models
- Compute-less computation
  - Lightning-fast computation on accelerators
  - Memory/interconnect/storage-bound applications
    - Data staging
    - Synergetic computation

Representative FORTH Projects

- TPC
  - Explicit parallel programming model with locality clauses
  - Fine-grain parallelism
  - Processor-independent parallel programming
- SARC
  - Locality management at the NoC level
  - Hardware/software interface, OS extensions
    - Translation mechanisms
    - Communication and synchronization mechanisms
- l-cores
  - Application-specific virtual machines
  - Virtual systems on a chip, spatial software decomposition

For further information

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