Discussion Week 14

OpenMP and bash

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Parallel Computing Models

- Shared memory
- pthread
- OpenMP

- Massage Passing
- MPI

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Difference with pthread

- Higher-level multithreading abstraction
- Automatic task scheduling
- Easier synchronization

- Applied to serial code
- Programming with pthread will require the parallel section based on parallel abstraction

How to?

- Coding
- Use “#pragma omp parallel” to indicate parallel section
- Use clauses to specify custom attributes

- Compiling
- The compiler supports OpenMP
- Flag “-fopenmp” is passed

Data Sharing Attribute Clauses

- shared
- The default data sharing attribute except for the loop counter.
- private
- Should be manually specified
- reduction
- A FASTER!!! way to join threads with specific operations
- Ex. “#pragma omp reduction (op: list)”
- op: +,-,*,&,|,&&,||
- list: the container for reduction

Synchronization Clauses

- critical

- Indicates a critical section.

- atomic

- Indicates an memory related instruction should be performed atomically.

- Can be faster than critical using special hardware instructions.

- barrier

- Wait for all the thread to reach this point.

- ...

Project Four Hints

- A bash
- Features you need to implement
- parser: parsers args
- builtin commands: jobs, cd, history, exit, kill [%num]
- redirect: “<”, “>”, “<<”, “>>”, “>&”, “>!”
- pipe: “|”
- history: history command, “!”
- background execution: “&”, bg, fg
- directory operations: ls, mkdir...

Some Details

- See ‘./src/bash_main.c’ for psuedocodes

Some Details

- Parser
- strtok ()...
- Execution
- “fork” syscall
- “exec” functions/syscalls, refer to glibc
- If background: waitpid ()
- Piping
- pipe ()
- Also chained pipes

Some Details

- !num
- Repeat the *num*-th command in the command history
- Builtin Commands
- Some require syscalls.
- No other processes should be forked.

Framework?

No fraamework!

Have fun!