

Selection task: ChampSim-CAWS

Rajesh Shashi Kumar (rajesh109876@gmail.com)

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Bugs in building ChampSim

- First compile shows the following errors. Using `g!/
error:/d` in the log to suppress warnings for now
- I recorded the compile logs each time using the linux `script <filename>` command and some post processing to remove weird characters `cat compile_log2 | perl -pe 's/\e([^\[\]]|\.[*?][a-zA-Z]|\.[*?\a])//g' | col -b > compilelog2`

1. Bug1: Incorrectly defined value_type on line 317 in main.cc. Needs to be of type `<uint64_t, uint64_t>` page_table

- Error message: `src/main.cc:317:57: error: conversion from ‘_Rb_tree_iterator<pair<[...],long unsigned int>>’ to non-scalar type ‘_Rb_tree_iterator<pair<[...],char>>’ requested`
- Fix 1
 - page_table is of the type `<uint64_t, uint64_t>` page_table
 - The value type on line 317 reads char instead, map `<uint64_t, char>::iterator pr = page_table.begin();`
- To fix, I changed this to map `<uint64_t, uint64_t>::iterator pr = page_table.begin();`

== Compiled again with fix1 ==

2. Bug2: page_table.end/begin() map function call missing parantheses

- Issues of this type:
 - page_table.end() on lines (in main.cc) 330,339,351,457
 - page_table.begin() on lines (in main.cc) 339
- Error message: `src/main.cc:330:12: error: no match for ‘operator==’ (operand types are ‘std::map<long unsigned int, long unsigned int>::iterator’ {aka ‘std::_Rb_tree_iterator<std::pair<const long unsigned int, long unsigned int> >’} and ‘)’`
- Fix 2
 - Line 330 reads `if (pr == page_table.end) { // no VA => PA translation found`
 - end() is a built-in function of map. Function call is missing parantheses

== Compiled again with fix2 ==

3. Bug3: Misspelled member functions (erase,insert) of map

- Error message:
 - `src/main.cc:360:24: error: ‘class std::map<long unsigned int, long unsigned int>’ has no member named ‘erse’; did you mean ‘erase’? 360 | page_table.erse(pr);`
 - `src/main.cc:361:24: error: ‘class std::map<long unsigned int, long unsigned int>’ has no member named ‘isert’; did you mean ‘insert’? 361 | page_table.isert(make_pair(vpage, mapped_ppage));`
 - `src/main.cc:430:24: error: ‘class std::map<long unsigned int, long unsigned int>’ has no member named ‘inset’; did you mean ‘insert’? 430 | page_table.inset(make_pair(vpage, random_ppage));`
- Fix 3
 - The misspelled function of map corrected for insert and erase

== Compiled again with fix3 ==

4. Bug4: Stray variable `remove_this_var` declared in multiple files that all contain separated (for ease of configuration) function definitions outside the CACHE class. The Makefile picks all 4 generated (from `*pref`) cc files (eg: `llc_prefetcher.cc`) for compilation, creating redundant definitions

- Error message:

- ChampSim-CAWS/prefetcher/llc_prefetcher.cc:2: multiple definition of `remove_this_var';
obj/prefetcher/l2c_prefetcher.o:ChampSim-CAWS/prefetcher/l2c_prefetcher.cc:2: first defined here

- Fix

- The `*pref` file contains functions defined outside the CACHE class. The build script copies `*pref` files to `*.cc` to pick the right configuration.
- Removing the variable declaration from the 3 files `no.l1d_pref`, `no.l1i_pref`, `no.l2c_pref` resolves the error in build. Removed it from the 4th file (`no.llc_pref`) as well since this variable is not used anywhere

== Build clean! ==

Tracer and PINtools

The runs was attempted with the following settings:

- Number of instructions for detailed simulation (10 million)
- Number of instructions for warmup (1 million)
- Iscpu: i7-4700MQ
- PIN tool version 3.17 (PIN3.2 is dated has issues on newer linux kernels such as [1,2,3](#)). ChampSim tracer works fine with 3.17

Ubuntu 20.04.1 LTS (Compiler: g++ 9.3.0; Linux Kernel: 5.4.0-54-generic) *** Reached end of trace for Core: 0
Repeating trace: /home/rajesh/work/CAWS/fixes/ChampSim-CAWS/dpc3_traces/hello_world.trace.xz Finished CPU 0
instructions: 10000000 cycles: 8891568 cumulative IPC: 1.12466 (Simulation time: 0 hr 0 min 20 sec)