

## Programming Assignment 3 Part A

ECE 786

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### Implementation Details

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To bypass the load instruction that fell within a certain range, we implemented a small function within the `ldst_unit` (in `shader.cc`), called `bypass_load`. This function takes the address and the instruction instances as inputs and determines whether it should be bypassed for L1 Data cache.

This function is called in `ldst_unit::memory_cycle` function since every instruction passes through this function before being delegated into different memory regions. This function is called again in `ldst_unit::cycle()` when the response from the interconnect is received, so the cache access can be returned properly.

We are collecting stats via the `shader_core_stats`, an instance of which is available in the `ldst_unit`. This stats object seems to collect other relevant data about different kernels, so we thought this would be a good place to report the total number of bypassed load cache accesses

### Result of Sample Run

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Note: kernels are separated by the double hyphen "--" marks.

```
bypassed load instructions: 26
gpgpu_n_tot_thrd_icount = 1316800
gpgpu_n_tot_w_icount = 41150
gpgpu_n_stall_shd_mem = 0
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 2083
gpgpu_n_mem_write_global = 26
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 65578
--
bypassed load instructions: 163
gpgpu_n_tot_thrd_icount = 2668224
gpgpu_n_tot_w_icount = 83382
gpgpu_n_stall_shd_mem = 0
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 4341
gpgpu_n_mem_write_global = 186
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 131386
--
bypassed load instructions: 963
gpgpu_n_tot_thrd_icount = 4224064
gpgpu_n_tot_w_icount = 132002
gpgpu_n_stall_shd_mem = 45
```

```
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 7642
gpgpu_n_mem_write_global = 1167
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 198604
--
bypassed load instructions: 5884
gpgpu_n_tot_thrd_icount = 6983648
gpgpu_n_tot_w_icount = 218239
gpgpu_n_stall_shd_mem = 957
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 17383
gpgpu_n_mem_write_global = 7146
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 274617
--
bypassed load instructions: 34108
gpgpu_n_tot_thrd_icount = 14968416
gpgpu_n_tot_w_icount = 467763
gpgpu_n_stall_shd_mem = 20294
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 63605
gpgpu_n_mem_write_global = 38926
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 401333
--
bypassed load instructions: 181692
gpgpu_n_tot_thrd_icount = 30442560
gpgpu_n_tot_w_icount = 951330
gpgpu_n_stall_shd_mem = 276343
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 258490
gpgpu_n_mem_write_global = 156656
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 763960
--
bypassed load instructions: 609201
gpgpu_n_tot_thrd_icount = 47075200
gpgpu_n_tot_w_icount = 1471100
gpgpu_n_stall_shd_mem = 1092583
gpgpu_n_mem_read_local = 0
gpgpu_n_mem_write_local = 0
gpgpu_n_mem_read_global = 609294
gpgpu_n_mem_write_global = 307172
gpgpu_n_mem_texture = 0
gpgpu_n_mem_const = 0
gpgpu_n_load_insn = 1490122
--
bypassed load instructions: 671956
```

gpgpu\_n\_tot\_thrd\_icount = 56621440  
gpgpu\_n\_tot\_w\_icount = 1769420  
gpgpu\_n\_stall\_shd\_mem = 1283226  
gpgpu\_n\_mem\_read\_local = 0  
gpgpu\_n\_mem\_write\_local = 0  
gpgpu\_n\_mem\_read\_global = 770337  
gpgpu\_n\_mem\_write\_global = 317587  
gpgpu\_n\_mem\_texture = 0  
gpgpu\_n\_mem\_const = 0  
gpgpu\_n\_load\_insn = 1816079  
--

bypassed load instructions: 674391  
gpgpu\_n\_tot\_thrd\_icount = 59115008  
gpgpu\_n\_tot\_w\_icount = 1847344  
gpgpu\_n\_stall\_shd\_mem = 1284090  
gpgpu\_n\_mem\_read\_local = 0  
gpgpu\_n\_mem\_write\_local = 0  
gpgpu\_n\_mem\_read\_global = 777734  
gpgpu\_n\_mem\_write\_global = 319026  
gpgpu\_n\_mem\_texture = 0  
gpgpu\_n\_mem\_const = 0  
gpgpu\_n\_load\_insn = 1887834  
--

bypassed load instructions: 674406  
gpgpu\_n\_tot\_thrd\_icount = 60432416  
gpgpu\_n\_tot\_w\_icount = 1888513  
gpgpu\_n\_stall\_shd\_mem = 1284090  
gpgpu\_n\_mem\_read\_local = 0  
gpgpu\_n\_mem\_write\_local = 0  
gpgpu\_n\_mem\_read\_global = 779807  
gpgpu\_n\_mem\_write\_global = 319038  
gpgpu\_n\_mem\_texture = 0  
gpgpu\_n\_mem\_const = 0  
gpgpu\_n\_load\_insn = 1953396