# Hands-on - DMA Transfer Using Control Block

Cell Programming Workshop
Cell/Quasar Ecosystem & Solutions Enablement

# Class Objectives

- **At the end of this class you should know how to do a DMA transfer using the control block**



 

# Class Agenda

- **The simpleDMA program**
- **The PPE program – simpleDMA.c**
- **The SPE program – simpleDMA_spu.c**

/opt/cell_class/Hands-on-30/DMA_getcb_libspe2/

# The simpleDMA Program

The actual executable resides in the ppu subdirectory. It's called 'simpleDMA'. It's a full CBE executable, with both PPE and SPE code.

The job of this program is to get the SPEs to print out the address of an array which is passed to it by the PPE.

**Program Details:**

- **The PPE Program:**
  - The PPE uses a malloc() command to allocate a small array in main memory.
  - The PPE then loads the address of the array into a control block.
  - The PPU prints the address of the array.
  - The PPE then creates the SPE thread, passing the address of the control block.

- **The SPE Program:**
  - The SPE performs a simple DMA to load the contents of the control block into its local store.
  - Then the SPE prints the array address contained within the contents of the control block, and exits.

# The PPE program – simpleDMA.c

```
#include "../simpleDMA.h"
#include <sched.h>
//#include <libspe.h>
#include <stdio.h>
#include <errno.h>
#include <libspe2.h>

/* we allocate one control block, to correspond to one SPE
    */
control_block cb __attribute__ ((aligned (128)));

/* this is the pointer to the SPE code, to be used at thread
    creation time */
extern spe_program_handle_t simpleDMA_spu;

spe_context_ptr_t speid;
unsigned int flags = 0;
unsigned int entry = SPE_DEFAULT_ENTRY;
spe_stop_info_t stop_info;
int rc;

/* here is the variable to hold the address returned by the
    malloc() call. */
int *data;

int main() {

  /* here is the malloc call */
  data = (int *) malloc(128);

  printf("address being sent in control block: %x\n",
     (unsigned int) data);

  /* load the address into the control block */
  cb.addr       = (unsigned int) data;

  /* allocate the SPE task */

     speid = spe_context_create(flags, NULL);
    spe_program_load(speid, &simpleDMA_spu);
    rc = spe_context_run(speid, &entry, 0, (unsigned long
    long *) &cb, NULL, &stop_info);
    spe_context_destroy(speid);

return 0;
```

# The SPE program – simpleDMA_spu.c

```
#include "../simpleDMA.h"
#include <spu_mfcio.h>
#include <stdio.h>

/* here's the local copy of the control block, to be filled by
    the DMA */
control_block cb __attribute__ ((aligned (128)));

int main(unsigned long long speid, unsigned long long
    argp, unsigned long long  envp)
{

  /* here is the actual DMA call */
  /* the first parameter is the address in local store to place
     the data */
  /* the second parameter holds the main memory address
     */
  /* the third parameter holds the number of bytes to DMA
     */
  /* the fourth parameter identifies a "tag" to associate with
     this DMA  */
  /* (this should be a number between 0 and 31, inclusive)
     */
  /* the last two parameters are only useful if you've
     implemented your  */
  /* own cache replacement management policy.
     Otherwise set them to 0.  */
mfc_get(&cb, argp, sizeof(cb), 31, 0, 0);

  /* now, we set the "tag bit" into the correct channel on the
     hardware  */
  /* this is always 1 left-shifted by the tag specified with the
     DMA     */
  /* for whose completion you wish to wait.
     */

  mfc_write_tag_mask(1<<31);

  /* now, issue the read and wait to guarantee DMA
     completion before we continue. */

  mfc_read_tag_status_all();

  printf("address received through control block = %x\n",
     cb.addr);

  return 0;
}
```

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