Lab 4 Allocation

I. Purpose

In this Lab, you will learn how to modify the source code to change the arbitration algorithm of our tool, and add the parameter of this tool for easy argument modify. Hope you will enjoy using our tool!

II. Procedure

● Fixed priority arbiter

1. Edit Reservation Phase
   a. Open NoximRouter.cpp
   b. Comment “start_from_port++”

```
// 1st phase: Reservation
        for (int j = 0; j < DIRECTIONS + 2; j++) {
            (... ...)
        }
//start_from_port++;
```

2. Save this file, and recompile tool.

```
% cd <INSTALL DIRECTORY>/bin
% make
```

3. Print lantency-Injection rate diagram under random and transpose1 traffic to show the performance difference between original and fixed priority arbiter. Thus we can verify our result is correct.

● Add Parameter to Parser command

1. Add new parameter in NoximMain.h
   a. Open NoximMain.h

b. Add parameter of fixed priority arbiter and original arbiter

```
#define ARBITER_OBLIVIOUS 0
#define ARBITER_FIXED_PRIORITY 1
#define INVALID_ARBITER -1
```

c. Set default arbiter as oblivious arbiter

```
#define DEFAULT_ARBITOR ARBITER_OBLIVIOUS
```

d. Add parameter in struct NoximGlobalParams

```
struct NoximGlobalParams {
       ... ...
       static int  arbiter;
};
```

e. Save file and open NoximMain.cpp to give an initial value

```
int NoximGlobalParams::arbiter                = DEFAULT_ARBITOR;
```

2. Open the NoximCmdLineParser.cpp

a. Add a new else-if block

```
else if (!strcmp(arg_vet[i], "-arbiter")) {
        char *arbiter = arg_vet[++i];
        if (!strcmp(arbiter, "oblivious"))
            NoximGlobalParams::arbiter = ARBITOR_OBLIVIOUS;
        else if (!strcmp(arbiter, "fixed"))
            NoximGlobalParams::arbiter = FLOW_CONTROL_CUT_THROUGH;
        else
            NoximGlobalParams::arbiter = INVALID_ARBITER;
        }
```

3. Edit the NoximRouter.cpp

a. At the line of “start_from_port++”, we modify the code into below:

```
if( NoximGlobalParams::arbiter == ARBITER_OBLIVIOUS )
    start_from_port++
else if ( NoximGlobalParams::arbiter == ARBITOR_FIXED_PRIORITY )
    start_from_port = DIRECTION_NORTH;
else
    assert(false);
```

b. Change the fixed priority port if needed.

4. Save those file, and recompile tool.

```
% cd <INSTALL DIRECTORY>/bin
% make
```

IV. Problems

Arbitration Comparison

Please compare the arbiter between Oblivious, fixed priority and Round-Robin.

Round-Robin Arbiter

After you follow the procedure in this lab, please try to implement the Round-Robin arbiter and verify it by comparison to original.

Matrix Arbiter

Please try to implement the Matrix arbiter and verify it by comparison to original.

Discuss Issue

Compare the performance between original arbiter, fixed priority, round-robin and matrix arbiter by plotting the average latency graph under random and transpose1 traffic

- Traffic: random, transpose1
- Routing: XY,Oddeven_z
- Selection: random
- Packet size = [2 10],Buffer size = 8
- Flow control: wormhole
- Random seed: time(NULL)
- Repetition:5
- Simulation time:50000
- Warm-up time:10000