Queuing in a Packet Switch

Assignment-3

Introduction

Objective

Understand - working of an input queue, an output queue and ISLIP protocol

INQ - Packets are queued at the InputPort

KOUQ - If Number of Packets is less than K, then Packets Queued at OutputPort. If more than K packets arrive in particular output port, select randomly K packets and remaining packets are dropped

iSLIP - Has three steps in Each iteration Request, Grant and Accept

INQ Algorithm

- Generate the Packet for Ports
- Packet Scheduling - Calculate the delay at Input Port
- Transfer the Packets
- Pseudo code

KOUQ

- Generate the Packet for Ports
- Packet Scheduling
- Transfer the Packet - Calculate the Delay at Output Port
- Pseudo code

PIM

- Parallel Iterative Matching
- developed by DEC Systems Research Center

PIM has three phases in each iteration

1. **Request Phase** - All input ports send request to output ports in parallel
2. **Grant Phase** - Each output port **Randomly** grants to one of the requests that it received
3. **Accept Phase** - Each input port **Randomly** accept one of the Grants that it is received
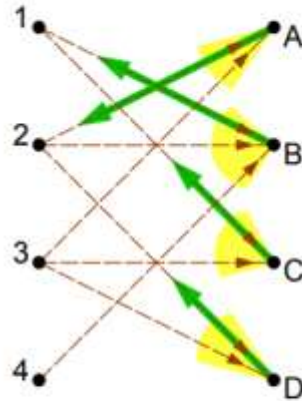
Example - First Iteration

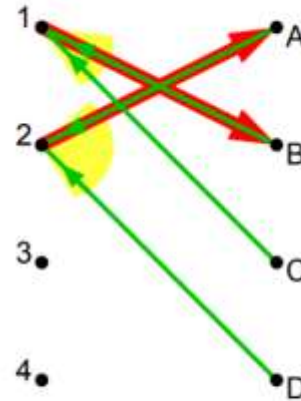Crossbar Scheduling: Parallel Iterative Matching (PIM)
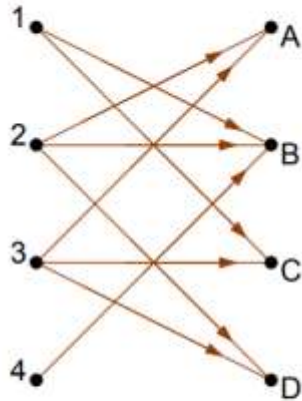
Request Phase:
All inputs send their requests in parallel

Grant Phase:
Each output, *independently*, grants to one of the requests that it received
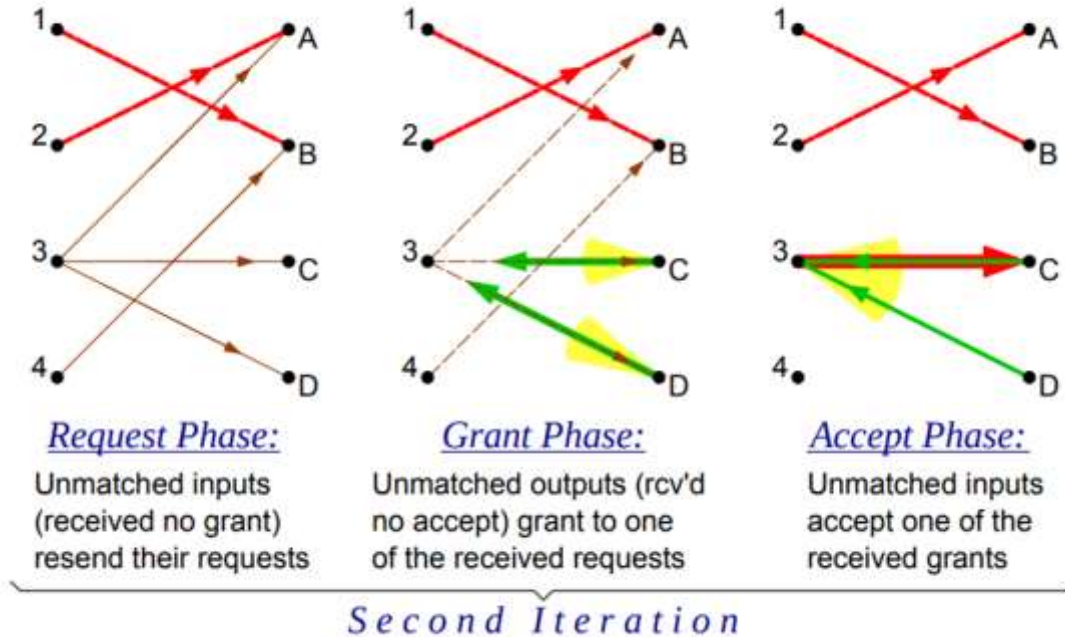
Accept Phase:
Each input accepts one of the grants that it received

First Iteration

Example - Second Iteration

Request Phase:
Unmatched inputs (received no grant) resend their requests

Grant Phase:
Unmatched outputs (rcv'd no accept) grant to one of the received requests

Accept Phase:
Unmatched inputs accept one of the received grants

Second Iteration

iSLIP

Variation of PIM
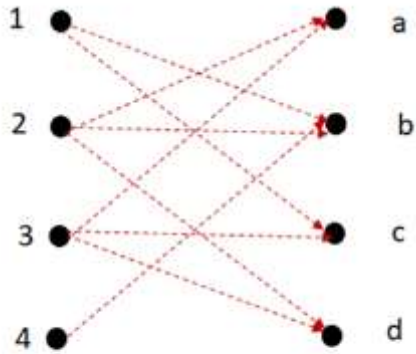
Request Phase: Same as PIM

Grant Phase:

- PIM grants randomly to one of the requesting inputs.
- iSLIP grants in Round-Robin order to the first requesting input after the previously marked input
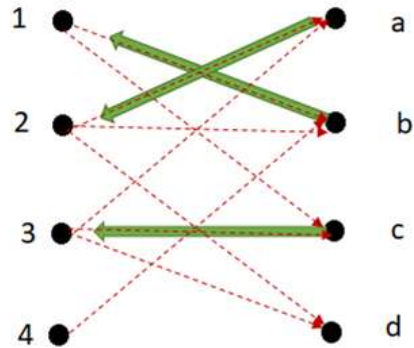
Accept Phase:

- PIM accepts randomly one of the granting outputs.
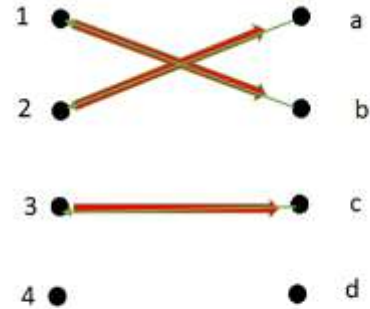- iSLIP accepts, in Round-Robin order

Example - iSLIP

Request Phase

Grant Phase

Accept Phase

Input to the Program

$ routing -N switchportcount -B buffersize -p packetgenprob -queue INQ | KOUQ | ISLIP -K knockout -out outputfile -T maxtimeslots

Option	Description	Default Value
N	N number of Input and Output Port	8
B	Size fo the Buffer	4
p	probability that an input port will generate a packet in a given slot;	0.5
queue	Algorithm – INQ or KOUQ or iSLIP	INQ
K	Max K packets are queued per Output Port	0.6
outputfile	File name to store the output	-
T	Max simulation time	10000

Knockout = K x N

Program - Output

N	P	Qtype	AvgPD	Std. Dev of PD	Avg LU

N - Number of Input and Output Port

P - Packet Generation Probability

Qtype - INQ or KOUQ or ISLIP

AvgPD - Average packet delay
$$AvgPktDelay=(TotalDelay*1.0)/(PacketTransmitted*1.0)$$

Std. Dev of PD - Standard Deviation of Packet Delay
$$StdDevPacketDelay=AvgPktDelay/sqrt(PacketTransmitted*1.0)$$

Avg LU - Average Link Utilization
$$AvgLinkUtilization=(PacketTransmitted*1.0)/((maxtimeslots*1.0)*(NumberofPorts*1.0))$$

A technical Report - Refer to Technical Report Requirements.

Thank you