Weighted Fair Queuing in MSR

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Motivation

• Need for Packet Schedulers in MSR for varying QOS requirements.

• Important Properties of Packet Schedulers
  
  Ease of Implementation, Fairness, Performance Bounds.

• Best Choice depends on applicable binding constraints

• Generic interface to “plug-in” new Packet Schedulers in MSR
QSDRR : Packet Scheduler in MSR

• Adopts Deficit Round Robin policy to schedule packets
• Reduces to round robin for Fixed size packets
• Fair in terms of throughput but lacks any reasonable delay bound
• Not suitable when fairness requirements are loose or when packet sizes are small
WF2Q+

- Scheduler maintains a virtual clock in addition to the real clock
- Separate queue for each session.
- When a packet reaches the head of its queue, it is assigned a Virtual Start Time ($S_i$) and a Virtual Finish Time ($F_i$)
WF2Q+

- Only the packets at the head of their queues with $\text{Virtual Start Time (Si)} \leq \text{Current Virtual Time (V(t))}$ are eligible for transmission.

- Among eligible packets, the one with the least $\text{Virtual Finish Time (Fi)}$ is picked for transmission.
Advantages of WF2Q+

- Lower Delay Bounds
- Easier to implement as compared to other Fair queueing Algorithms
- Complexity $O(\log n)$: (n is number of active flows)
WF2Q+ In MSR

- Common WF2Q+ Implementation consists of two parts
  - Packet scheduler – Schedule Packet with smallest finish time
  - Packet drop policy – Different Approaches

- WF2Q+ In MSR
  - Same packet scheduler
  - Different packet drop policy
Packet Drop Policy

• Degree of Aggregation Policy
• Drop Packets from Queue that contains packet with largest finish number
• Advantageous for Best effort and guaranteed connections
Implementation In MSR

- Implemented Entry points for Enque and Deque
- Reservation of Flows implemented by adding an entry to the FTE (flow table entry) for either the exact match or general match classifier.
- Using command protocol to send the weight when creating the filter.
Implementation contd.

• WF2Q+ retrieves flow specific weight from FTE.

• A generic Interface implemented to easily add packet schedulers
Results

Bandwidth Reservation (For UDP Flows)

- Flow 1 (0.5 MB)
- Flow 2 (1 MB)
- Flow 3 (1.5 MB)
- Flow 4 (2 MB)
- Flow 5 (5 MB)
Results contd.

End To End Delay vs Packet Arrival time (For UDP Flows)

Packet Arrival Time (ms)

Delay (ms)

QSDRR Flow 1
QSDRR Flow 2
QSDRR Flow 3
WF2Q+ Flow 1
WF2Q+ Flow 2
WF2Q+ Flow 3
Future Work

• Integrate in the MSR packet scheduler framework
• Implement a faster and efficient search mechanism to select packets to be dequeued
• Test the performance with cross traffic flows