

# CPU Scheduling for Active Processing using Feedback Deficit Round Robin

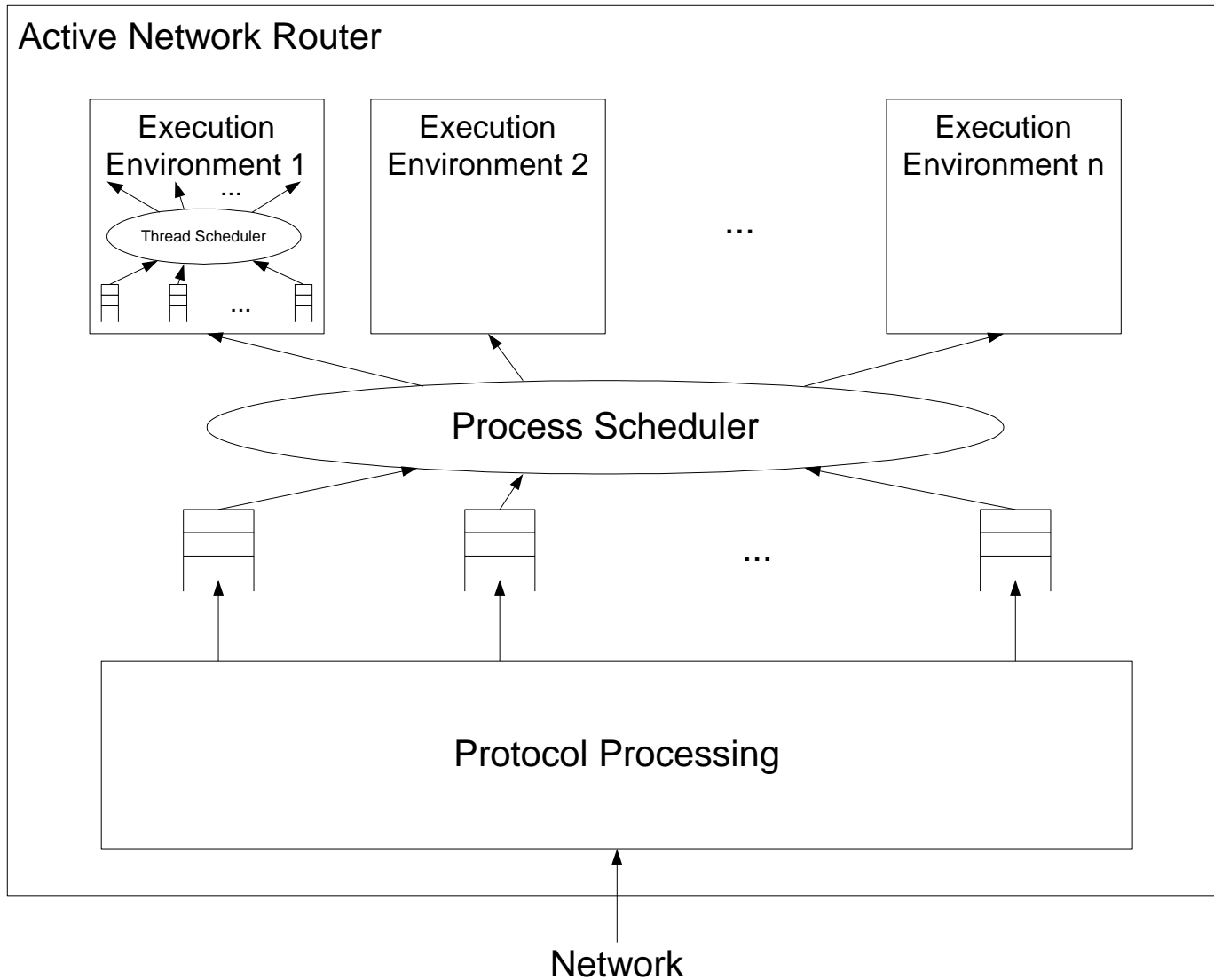
Tilman Wolf  
Dan Decasper

Washington University in St. Louis

# Overview

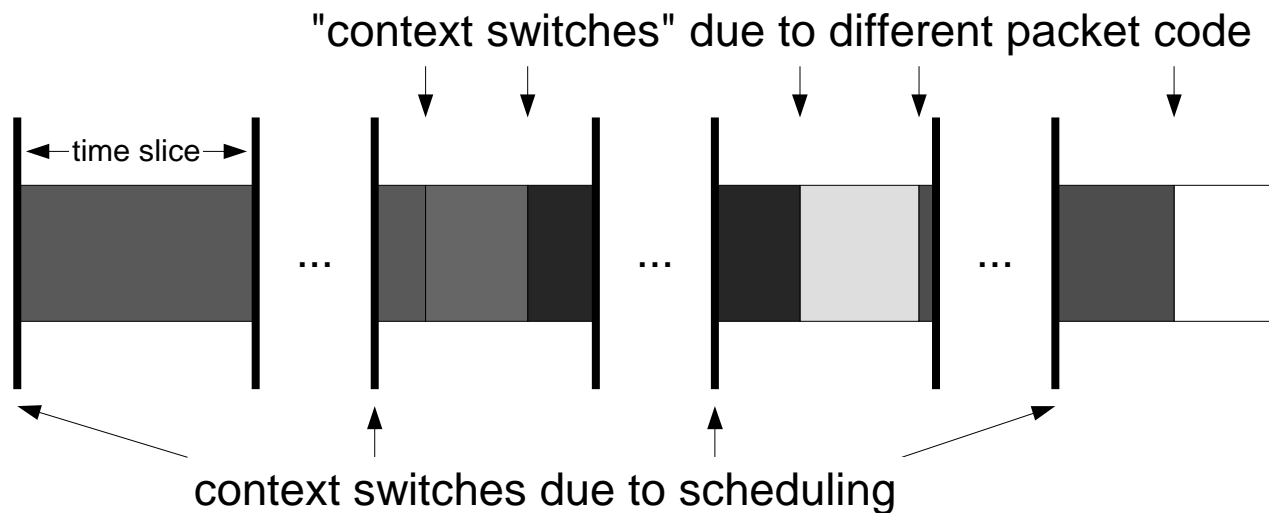
- Scheduling for Active Networks
- Timeslicing
- Deficit Round Robin
- Feedback Mechanism
- Results
- Summary

# Active Networks



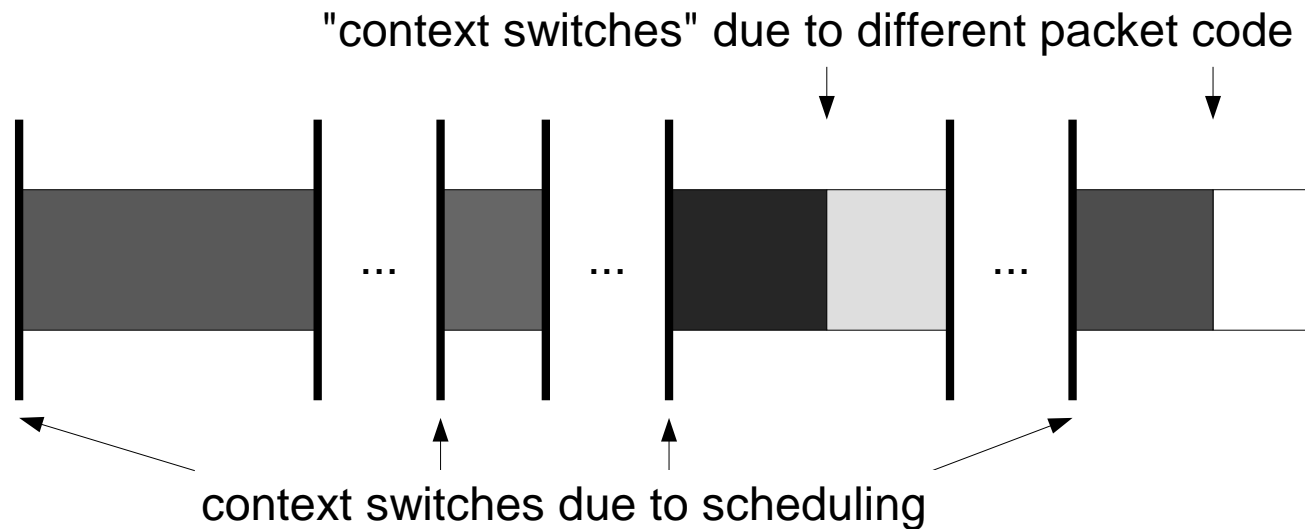
# Timeslicing

- Allocates a time slice for each process
- Context switches not aligned  
=> additional overhead



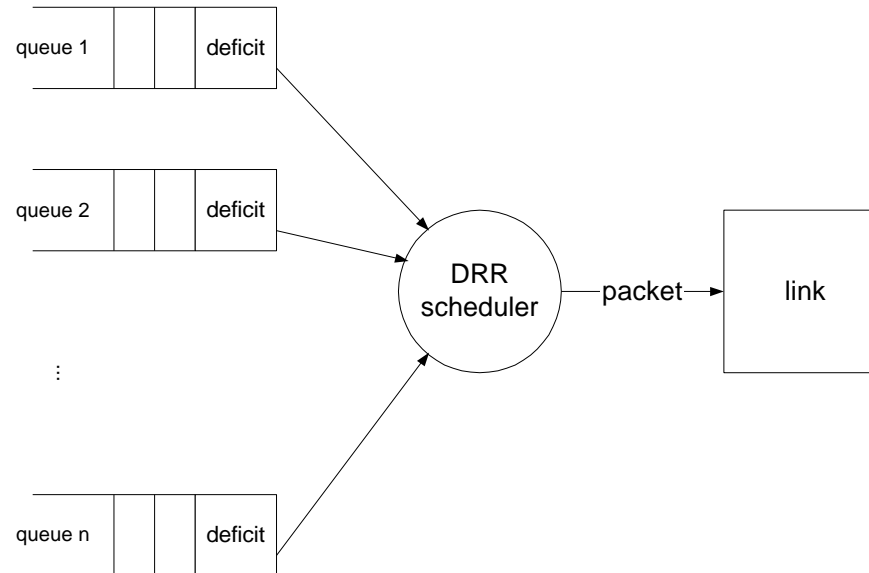
# Feedback Deficit Round Robin

- Idea: align context switch with packet boundaries



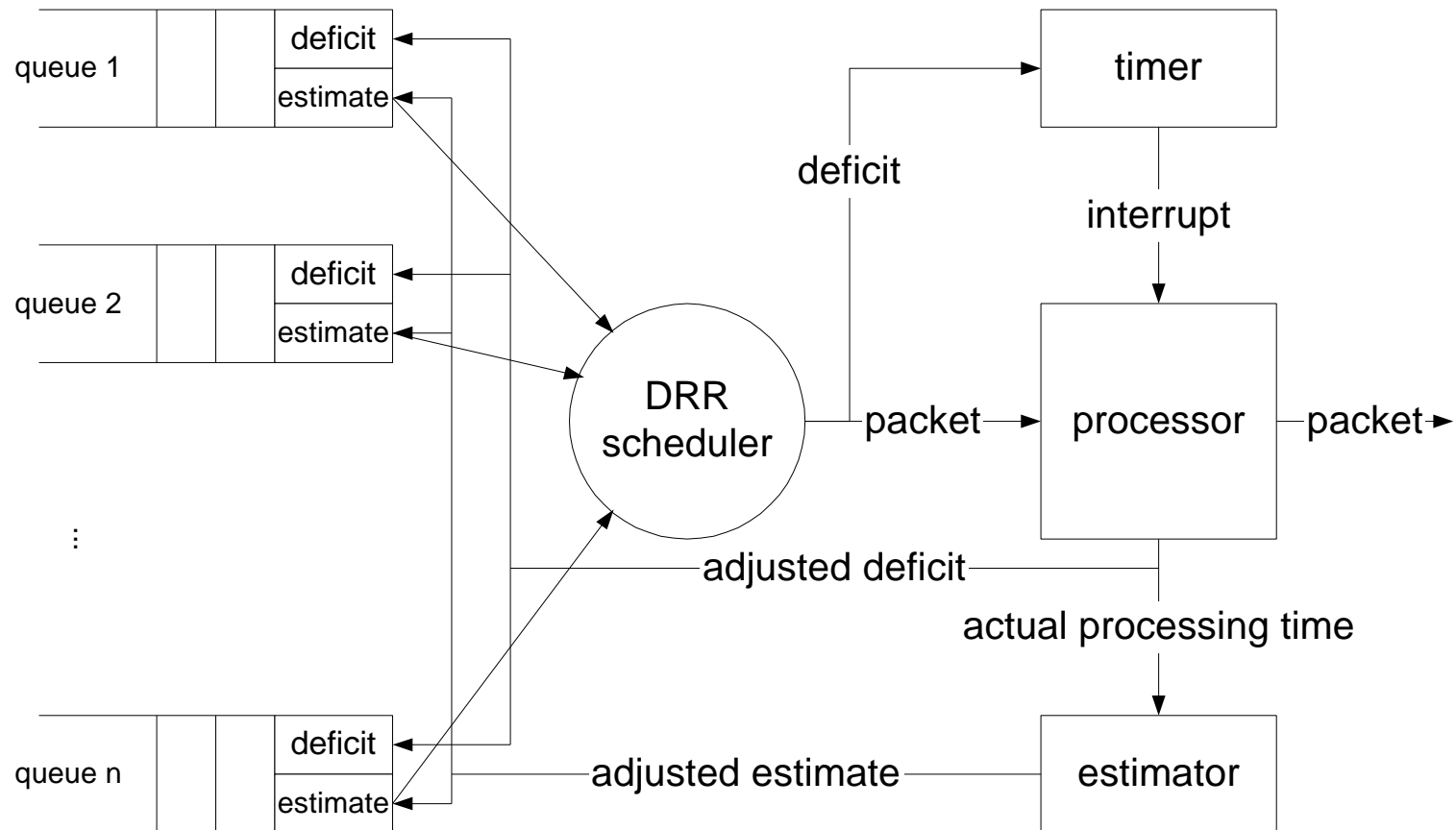
# Deficit Round Robin

- Packet-oriented scheduling for bandwidth



- Requires packet length to be known  
(processing time unknown in advance)

# Feedback Deficit Round Robin



# Estimators

- Constant:

$$estimate_n = estimate_{n-1} = const.$$

- Exponential average:

$$estimate_n = \mathbf{a} \cdot actual_{n-1} + (1 - \mathbf{a}) \cdot estimate_{n-1}$$

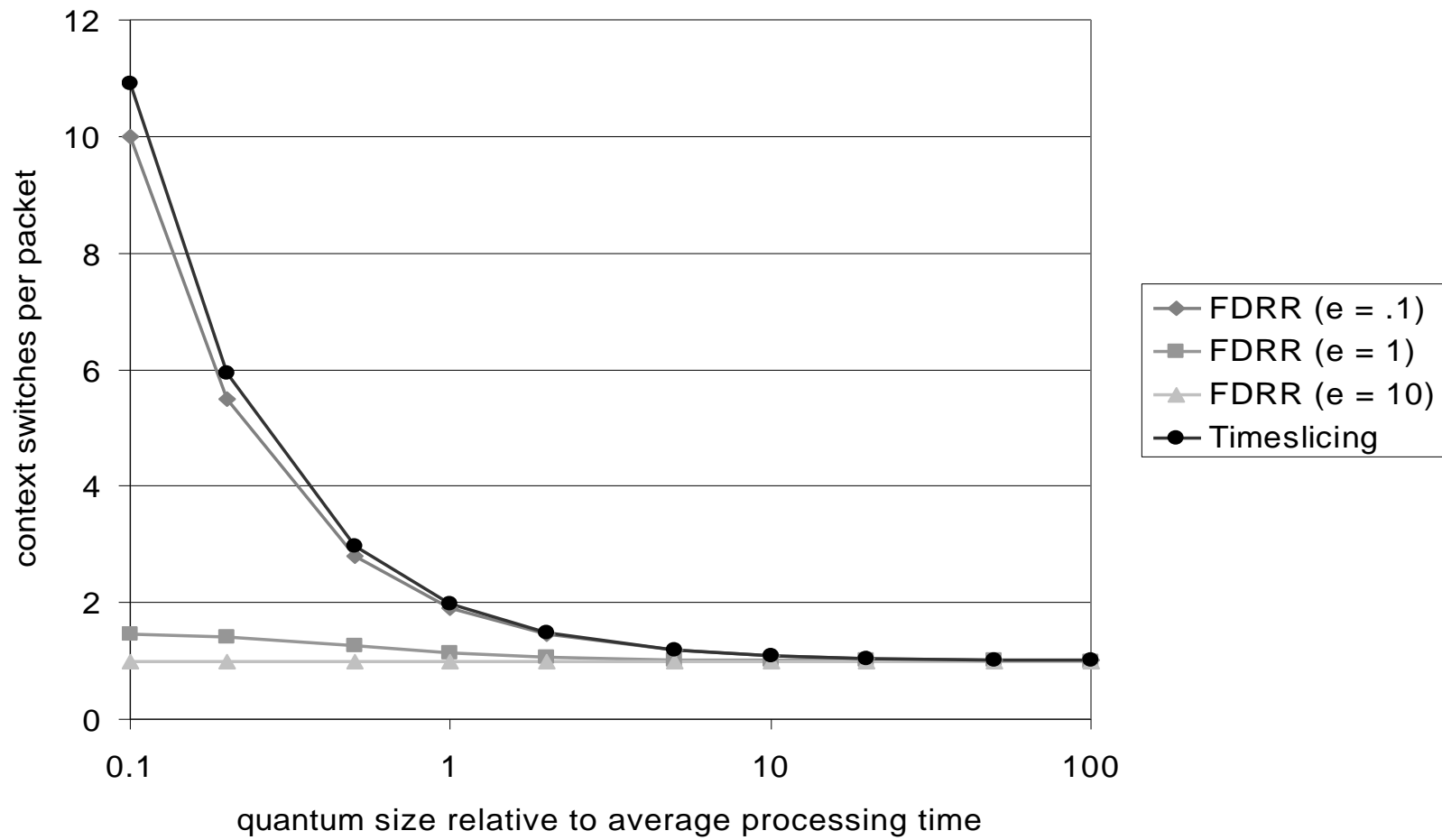
- Packet size dependent:

$$estimate_n = f_n(size(p_n))$$

$$f_n = E(f_{n-1}, actual_{n-1})$$



# Results



# Summary

## Feedback Deficit Round Robin

- $O(1)$  complexity per packet
- Fairness for all queues
- Fewer context switches

## Future Work:

- Evaluate different Estimators on real traffic