Announcements

- **Reading**
  - Chapter 6 (6.1 & 6.2)
- **Project #3**
  - Is on the web
- **Midterm #1**
  - Was returned at the end of class
Project Notes

- **Suggested order:**
  - Start with timer thread and timer functions
  - Write shortest path code
  - Add hello packets
  - Add flood packets
  - Add full routing table computations
Timer Thread

- **Queue is used like an inbox**
  - Other threads submit requests via queue
- **Keep a linked list of pending timeouts**
  - Convert timeouts to absolute time using `pthread_get_expiration_np`
  - Change dequeue to use take absolute timeout

**Table of pending Timers**

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:10:5.3</td>
<td>T.O. Req 4 sec. ICMPQ</td>
<td>#5</td>
</tr>
<tr>
<td>10:10:8.9</td>
<td>T.O. Req 5 sec. RoutingQ</td>
<td>#3</td>
</tr>
</tbody>
</table>

```c
While (1) {
    dequeue(timerQ, timeOfFirstPendingTO);
    if (ret value == timeout) {
        processTimeout – remove from table, send message to requesting thread
    } else {
        processRequestForNewTimeOut
        - add to pending timers table
    }
}
```
Routing Information Flow

Routing Table

<table>
<thead>
<tr>
<th>Dest</th>
<th>Next Hop</th>
</tr>
</thead>
</table>

Table of Network Topology

- Contains data received via flooding

List of Possible Neighbors

- Send hello to these hosts

List of Live Neighbors

- Received hello from these hosts
- Sent (via flooding) to all other nodes
- Each item has a "live" flag

Flooding

Hello Packets
Managing IP Addresses

- IP Addresses used to be allocated based on
  - Class A: 16 million addresses
  - Class B: 64K addresses
  - Class C: 256 addresses
  - One routing table entry for each assigned user in each class

- Need to make better use of IP addresses
  - Add a mask bit to the routing tables
    - And an address with the mask and then match entry
    - If two match, one with most 1’s in mask wins
      - More specific info used
      - Allocate from geography based pools
Midterm Results

<table>
<thead>
<tr>
<th>Problem</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Max</td>
<td>10</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>15</td>
<td>92</td>
</tr>
<tr>
<td>Mean</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>18</td>
<td>11</td>
<td>10</td>
<td>64.3</td>
</tr>
<tr>
<td>Std. Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14.6</td>
</tr>
</tbody>
</table>

- Grades are based on a curve
- Exam #1 is 12.5% of the semester grade
Midterm Re-grading Policy

- **All Requests must be submitted in writing**
  - Please type your request.
  - Requests should explain why you feel additional credit is deserved.

- **When to submit**
  - No sooner than 24 hours after the exams were made available for return.
  - No later than 1 week (end of class Th. Oct. 18) from when they were made available.

- **Requests can result in**
  - Points being added or subtracted from score.
  - All questions being re-graded, not just the one(s) requested.