

# Tine Scheduling at High Frequencies

*Presented By*

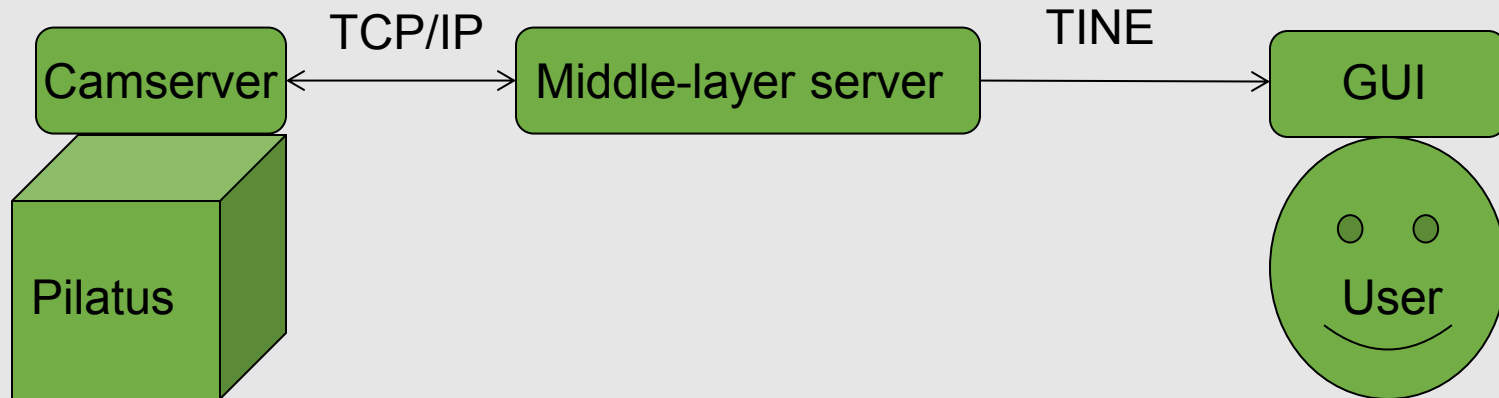
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# Use Case

- Pilatus 6mf detector
  - Realistic sample collections (max total 65535 frames @ 200Hz)
    - total 3000 frames @ 50Hz;
    - total 40000 frames @188 Hz;



- How to inform the GUI client about the progress of a collection?

# First Attempt

- Server informs client of every single frame collected
  - SystemScheduleProperty() call at server for every integer 1 to max total number of frames;
  - Client attaches to property as CM\_EVENT at 1000 ms update rate/polling interval;
- Test – collection of 1300 frames @188Hz
  - 1<sup>st</sup> collection – OK
  - 2<sup>nd</sup> collection after a ~10sec pause – no data arrives at client
  - 3<sup>rd</sup> collection after another ~10sec pause – no data arrives at client
  - 4<sup>th</sup> collection after some longer wait – all frames arrive at client
- Some limit suspected but 1300 integers?

# Brainstorming

- No data sent out by the server for set 2 and 3 (tcpdump)
- The server will not send any data if:
  - There are no interested clients or the server sees no clients interested in the scheduled property
  - The data is not changing
  - The client has not attached to the property with the CM\_EVENT mask
- The client will start dropping data at the network level if its socket receive buffers get filled
  - Default socket receive buffer size – 64Kb
  - 1300 integers = 5200 bytes?

# Brainstorming (cont.)

- Scheduling multiple single ints is expensive
  - Header + 4bytes = 50bytes per message
  - 1300 integer events = 65000 bytes + timestamps
- Mechanism of subscription renewal:
  - Client has to tell server it is still alive at given intervals
  - Polling interval 1000ms => expected update rate 1Hz => subscription set 60 updates => subscription counter 10 or below = time to renew subscription
- Client does not succeed in renewing its subscription on the property
  - Client has to renew every ~250ms – every 50 updates \* 5ms
- Server marks contract as expired and stops sending data

# Second Attempt

- Increase client socket receive buffer size
- Allow fast polling intervals at server and use polling interval of 50ms at client
  - larger subscription set
  - renewal cutoff set to a much high number
- **Caveat:**
  - a lot of interrupt handling every 5ms;
  - everything artificially busy
- Can this be avoided?

# Third Attempt

- Client socket receive buffer size increased 4-fold
- Do not send every single frame number
- `SetSystemSubscriptionRenewalLength()` at the server to the total number of frames for the duration of a collection
- Restore renewal length to default after collection ends
  - Subscription counter for property not restored
  - Only new contracts affected

# Final

- Property subscription counter goes to default after restore
- Setting is global – affects all properties
- Change the subscription renewal interval per property?



# Acknowledgements

- Philip Duval