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# A Communication Middleware Quality Enhancement with Qt Framework

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# Goals



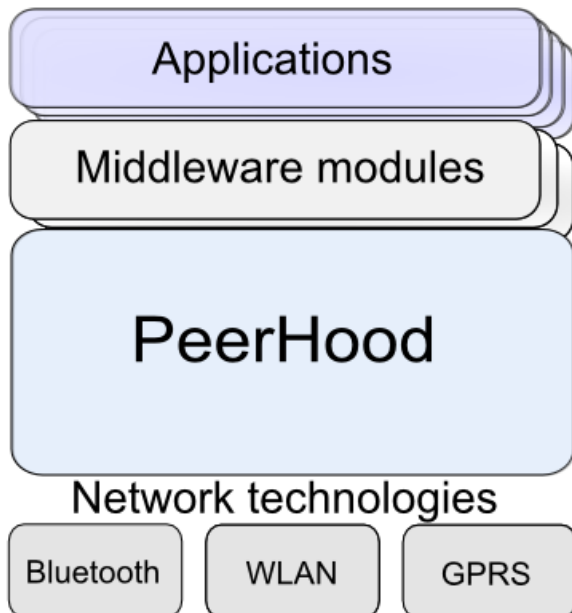
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- Study feasibility of Qt framework and Qt Mobility for communication middleware use.
- Advantages and disadvantages of using Qt framework
- What kind of changes the Qt causes to existing system architecture

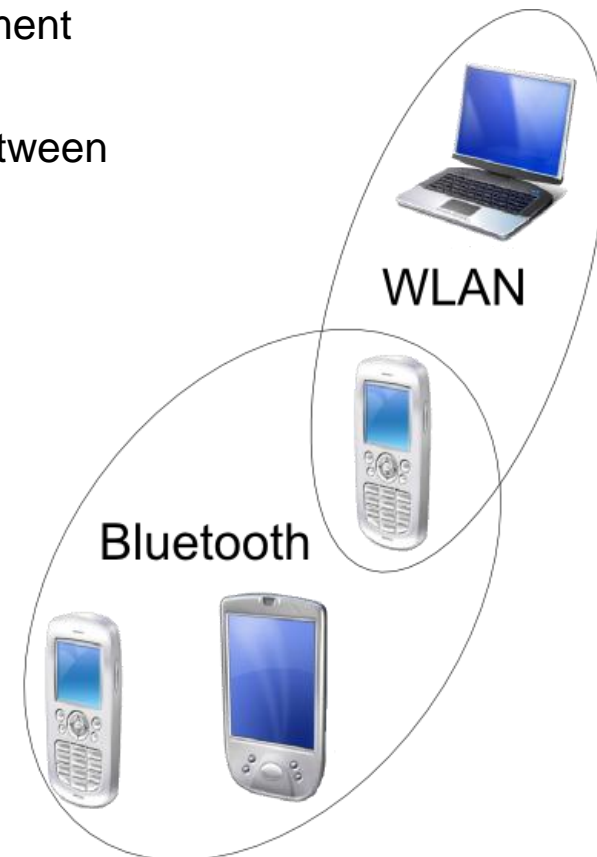
# PeerHood Middleware



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- PeerHood is peer-to-peer service sharing middleware for mobile environment
- Transparent communication between PeerHood devices
- Device monitoring on network neighborhood
- Network implementations are dynamic plugins



PeerHood available at <http://www.gitorious.org/peerhood>

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# Qt Framework and Qt Mobility

## - Used Technologies -

### Qt Framework

- Qt Core
  - Event system
  - Signals and Slots
  - Containers
  - Data streams
  - Timing
  - Settings
- Qt Network
  - TCP and UDP sockets (and TCP server)

### Qt Mobility

- System information
  - Network signal strength monitoring
- Bearer management
  - Available network types and configurations

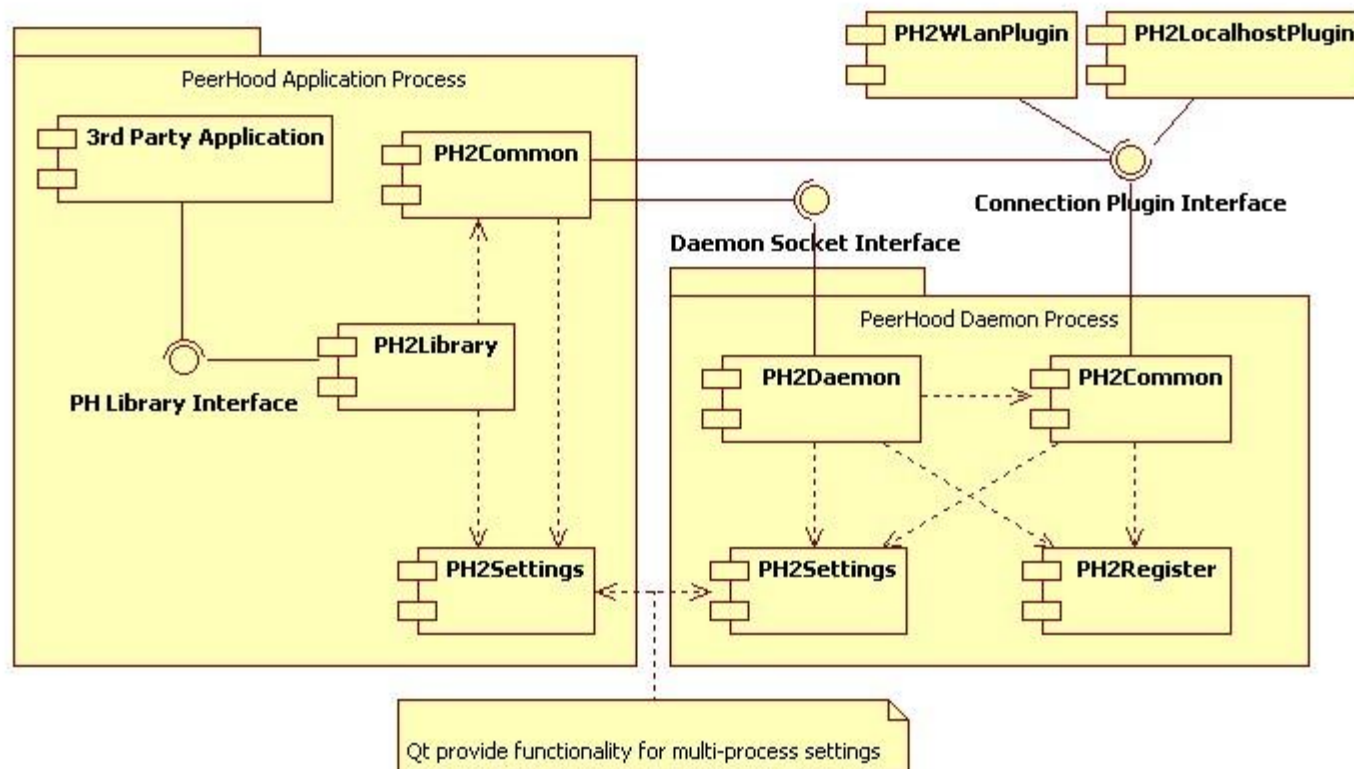


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# Qt Based PeerHood Design and Implementation



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# Qt Based PeerHood Design and Implementation, contd.



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- Implemented almost fully with the Qt framework
  - Not support for ICMP ping implementation
- Almost all PeerHood requirements are implemented in the new PeerHood implementation
  - Connection roaming was left out of scope
- WLAN and Localhost network plugins implemented
  - GPRS and Bluetooth were not implemented in this study
- Qt event loop is used instead of multithreading
  - Multithreading can be enabled later on if needed

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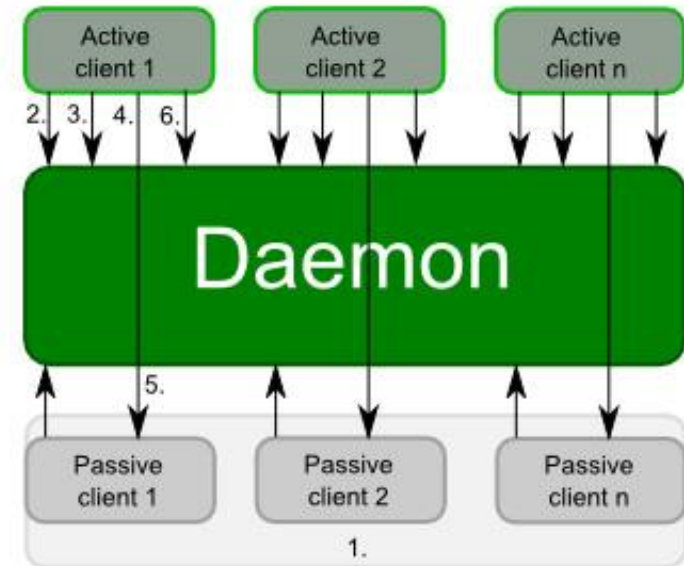
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# Evaluation



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- Static Code Analysis with SourceMonitor
- Reliability test with test set by performing common PeerHood functionalities in loop.
- Memory Usages
  - Valgrind massif tool
  - Exmap tool
- CPU Usages
  - time command



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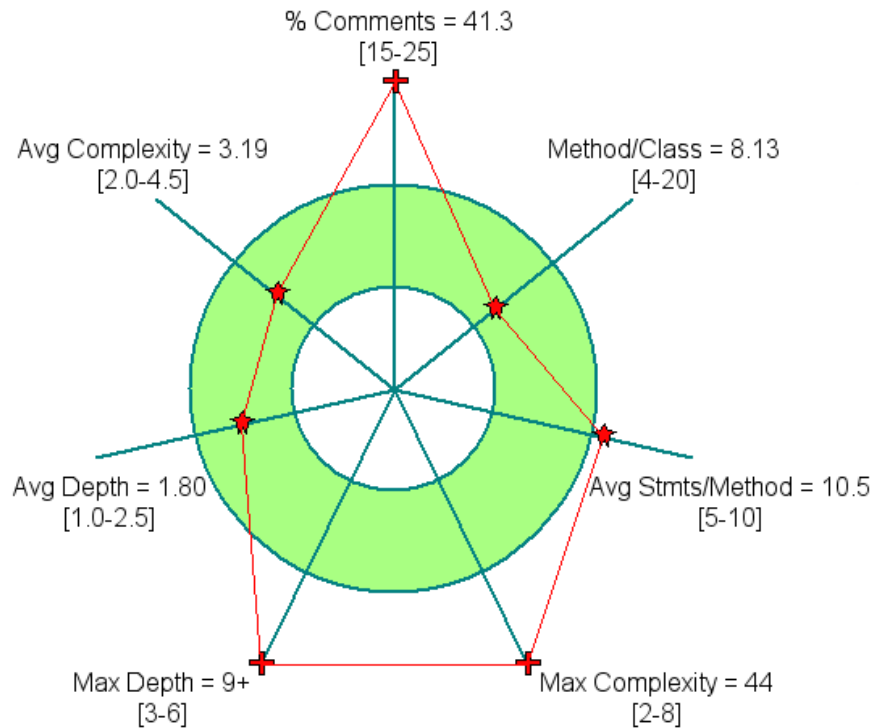
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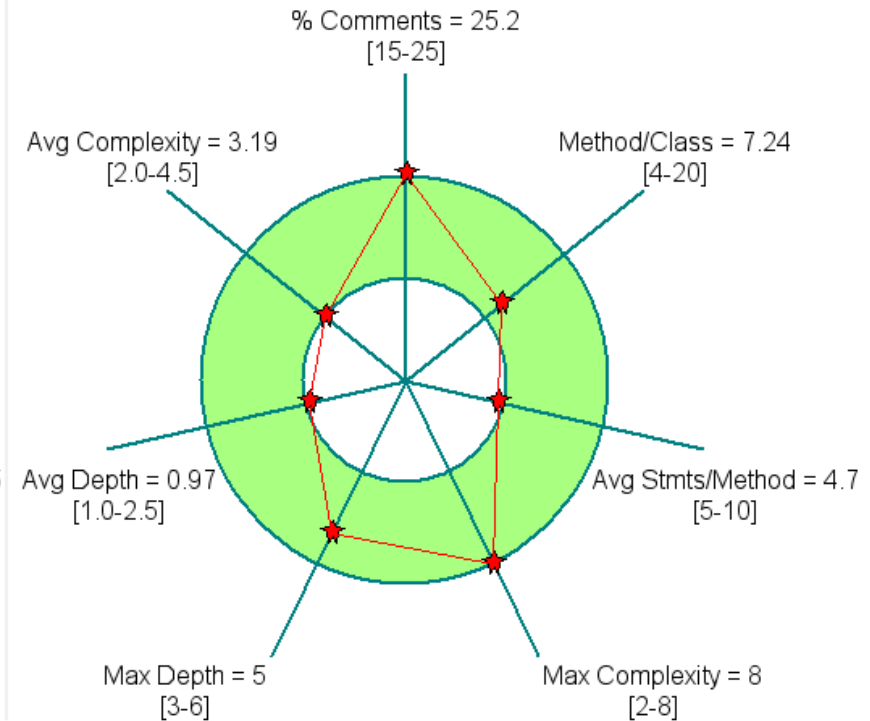


# Evaluation, Static Code Analysis

Kiviatic Metrics Graph: Project 'PeerHood1'  
Checkpoint 'Baseline'



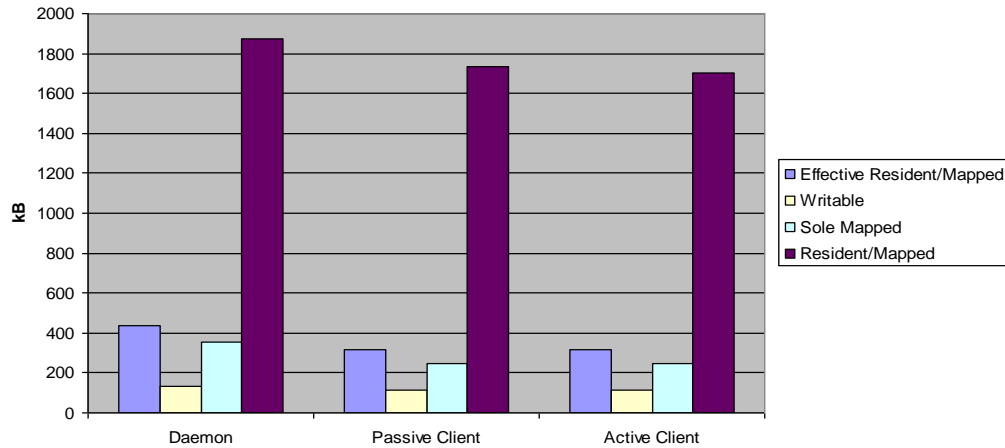
Kiviatic Metrics Graph: Project 'PeerHood2'  
Checkpoint 'Baseline'



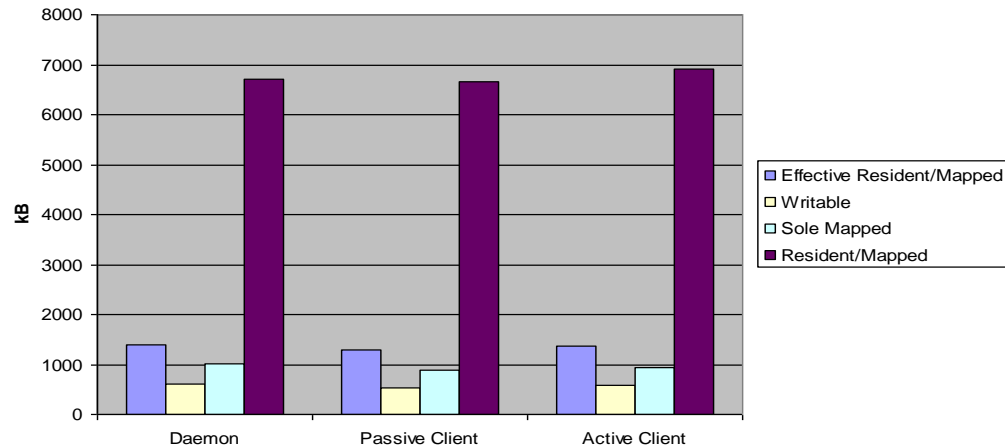


# Memory Usage

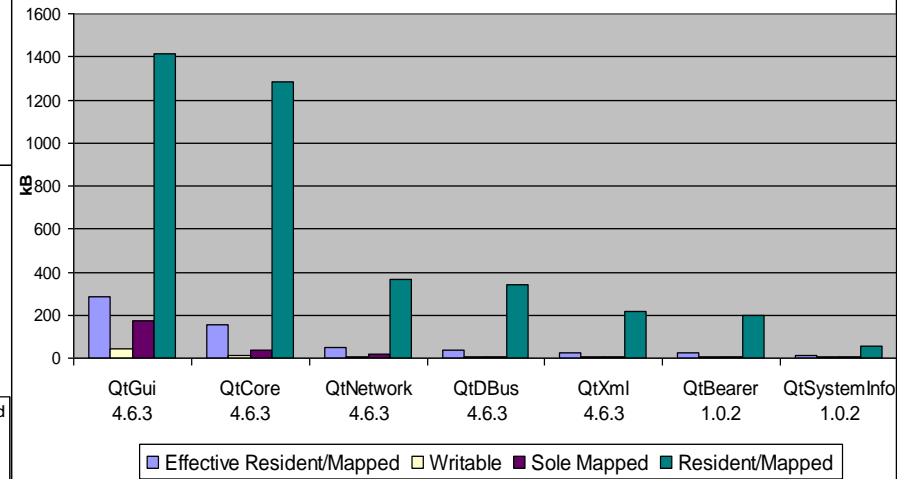
### PeerHood1 Memory Usage



### PeerHood2 Memory Usage



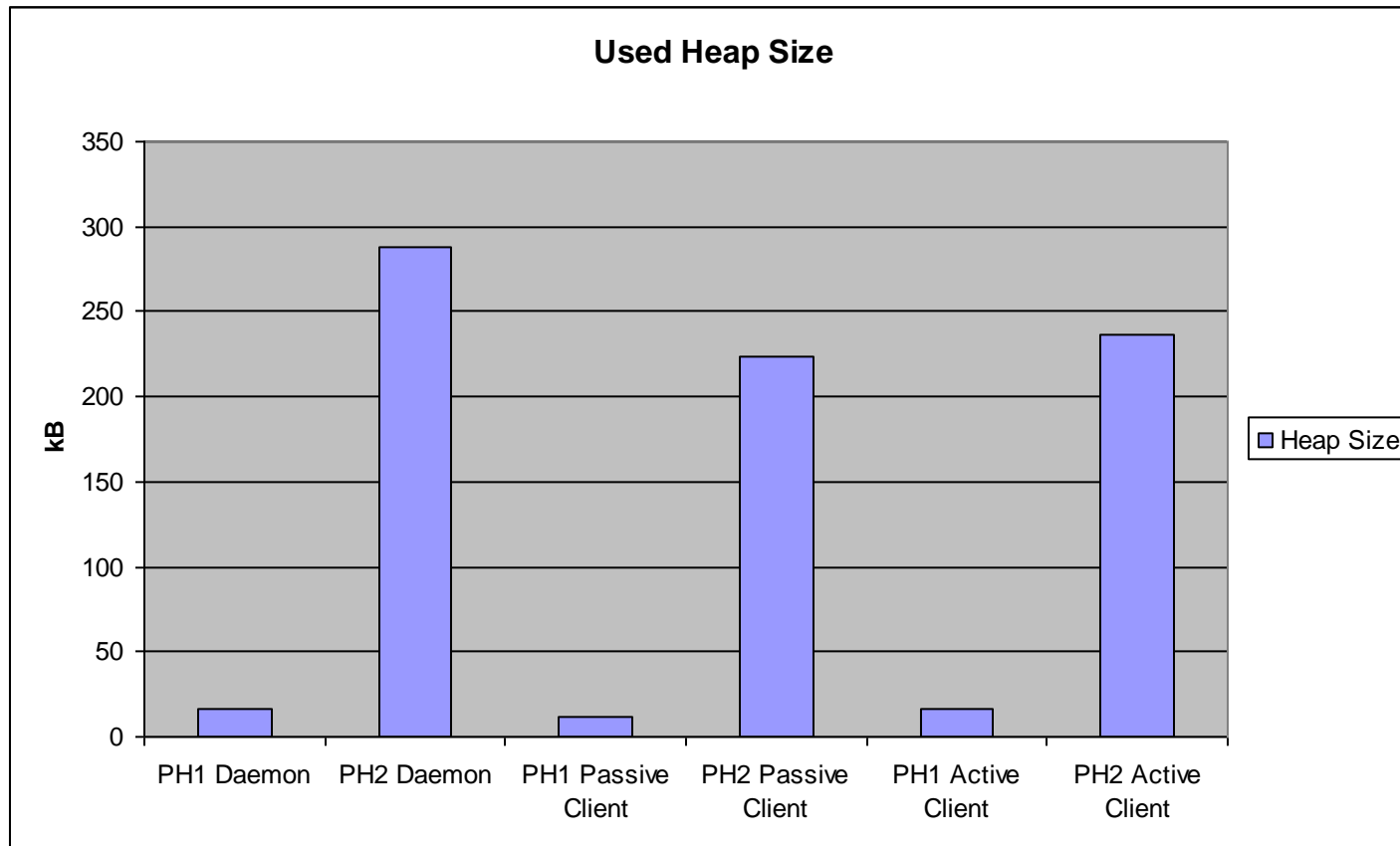
### Memory Usage of Different Qt Libraries



# Memory Usage, Contd.



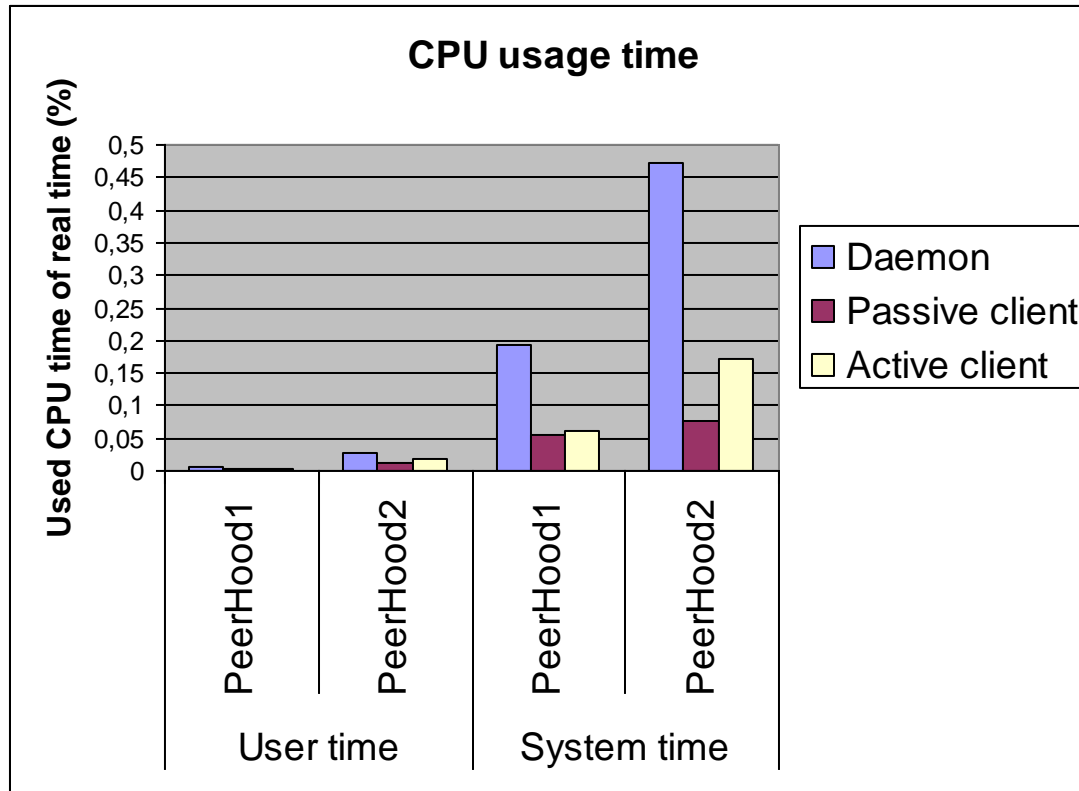
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# CPU usage



# Conclusions



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- The Qt framework offers a large set of tools for communication middleware programming
- The use of Qt framework increases resource usage of the PeerHood implementation a much
  - However, memory and CPU usages are in usable level
- The Qt framework provides excellent portability for the PeerHood
- The signals and slots mechanism enables flexible and robust system design

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## Questions?

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## PeerHood is available for use and contribution

PeerHood available at <http://www.gitorious.org/peerhood>

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