# MACSIM:

An Agent Oriented Simulation Code for the MNR

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- MACSIM's structure
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  - Networking
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# LabVIEW Overview

- Graphical programming language G
  - Virtual Instrument
    - Interactive user interface
      - Control/Indicator
    - Dataflow diagram

- Modular programming
  - Sub VIs

Front Panel

Block Diagram

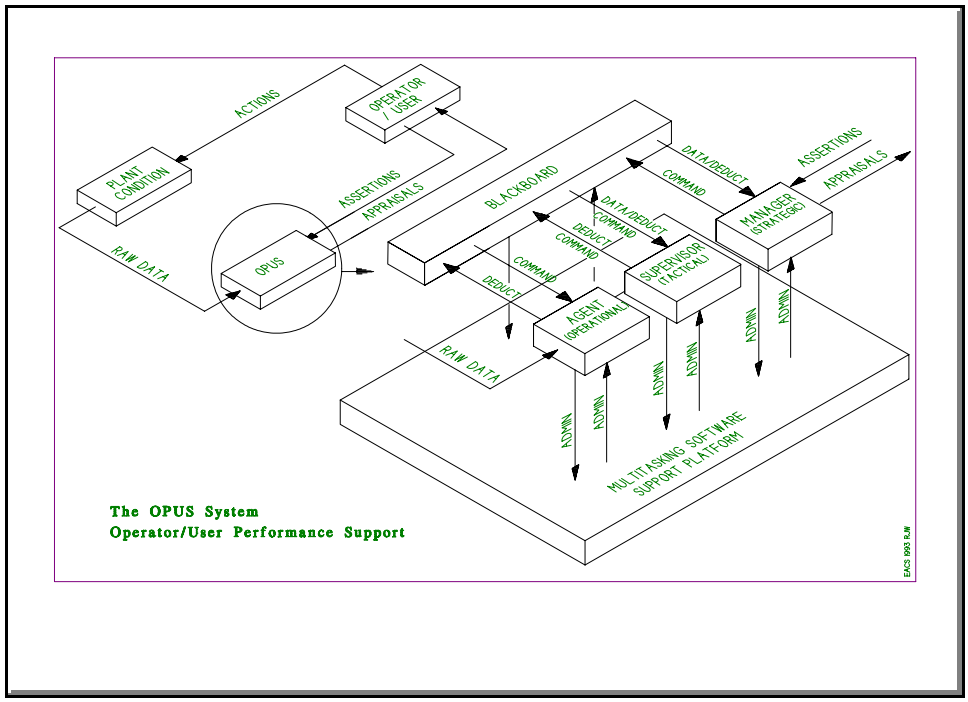
# Blackboard sample

| # Avail Computers | 1 | | | |
|---|---|---|---|---|
| Superv status | 0 | | | |
| Computer | 1 | | 2 | |
| I.P. | 130.113.142.39 | | 130.113.142.40 | |
| FUNCTION | 1 | | 1 | |
| | Status | Command | Status | Command |
| Manager | 0 | 0 | 0 | 0 |
| | | | | |
| Supervisor | | | | |
| | | | | |
| Reactor Physics | 0 | 0 | 0 | 0 |
| Thermal Hydraulics | 0 | 0 | 0 | 0 |
| | | | | |
| Technician | | | | |
| | | | | |
| Flux | 0 | 0 | 0 | 0 |
| Poison | 0 | 0 | 0 | 0 |
| Burn up | 0 | | 0 | 0 |
| Controller | 0 | | 0 | 0 |
| Thermal hydraulics | 0 | | 0 | 0 |
| | | | | |
| % Free Resources | 1 | | 75 | |

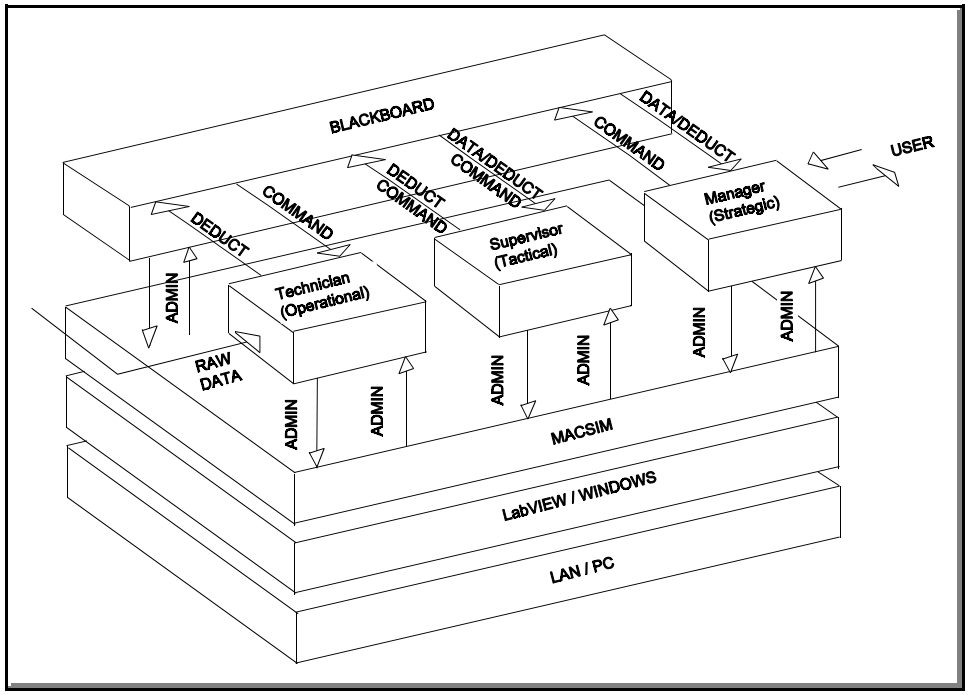
# Performance report

| Transfer type | Data Size | Transfer time (ms) |
|---|---|---|
| DDE | 1 cell | ~ 10 |
| DDE | 28 X 34 cells | ~ 70 |
| DDE+TCP | 1 cell | ~ 60 |
| DDE+TCP | 28 X 34 cells | ~ 120 |
| multiple DDE + TCP | 10X1,10X3, 34X3,28X34 cells | ~ 150 |
| TCP | ASCII file 0.67 Mb | ~ 3 000 (~ 225 kb/s) |

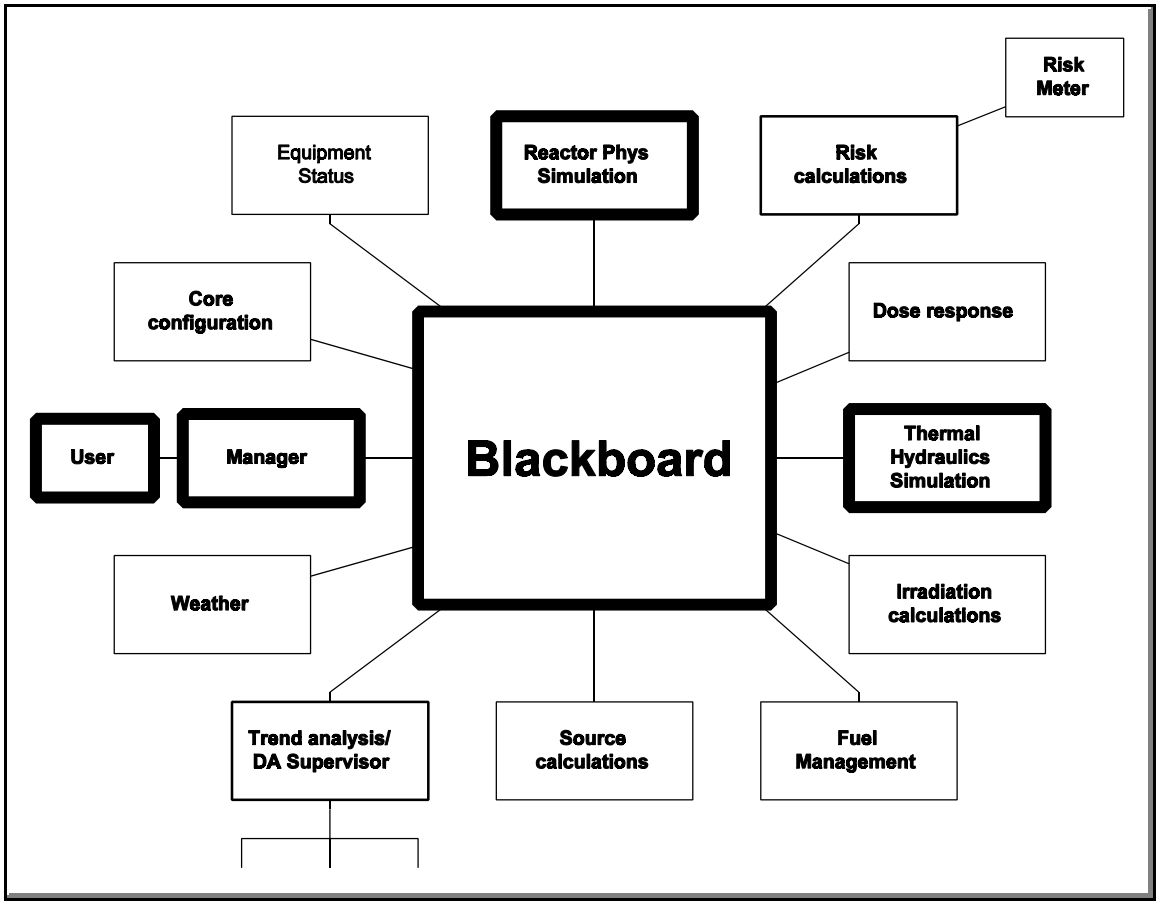
# OPUS' overall schema



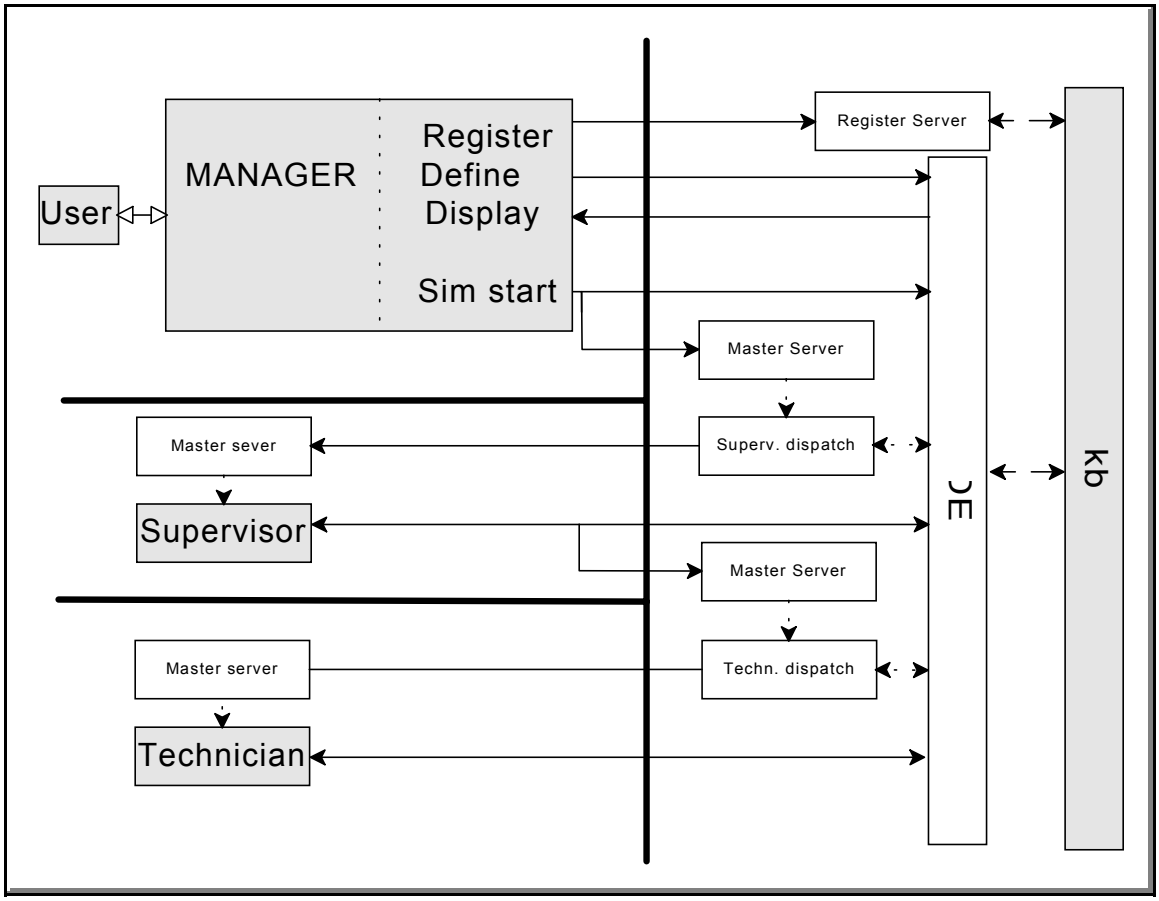

# MACSIM's overall schema



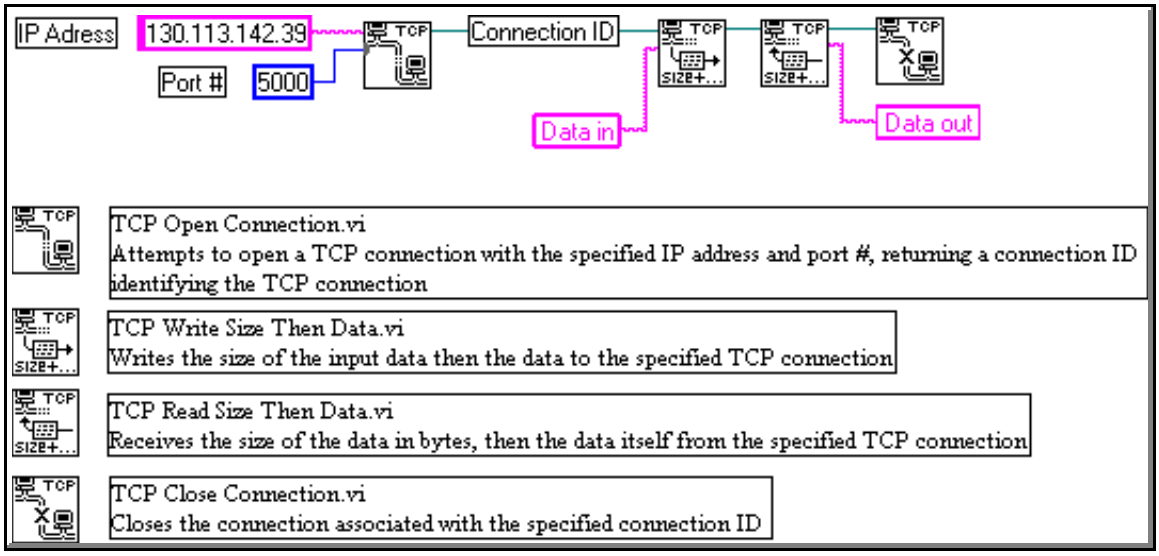
# Conceptual layout of agents



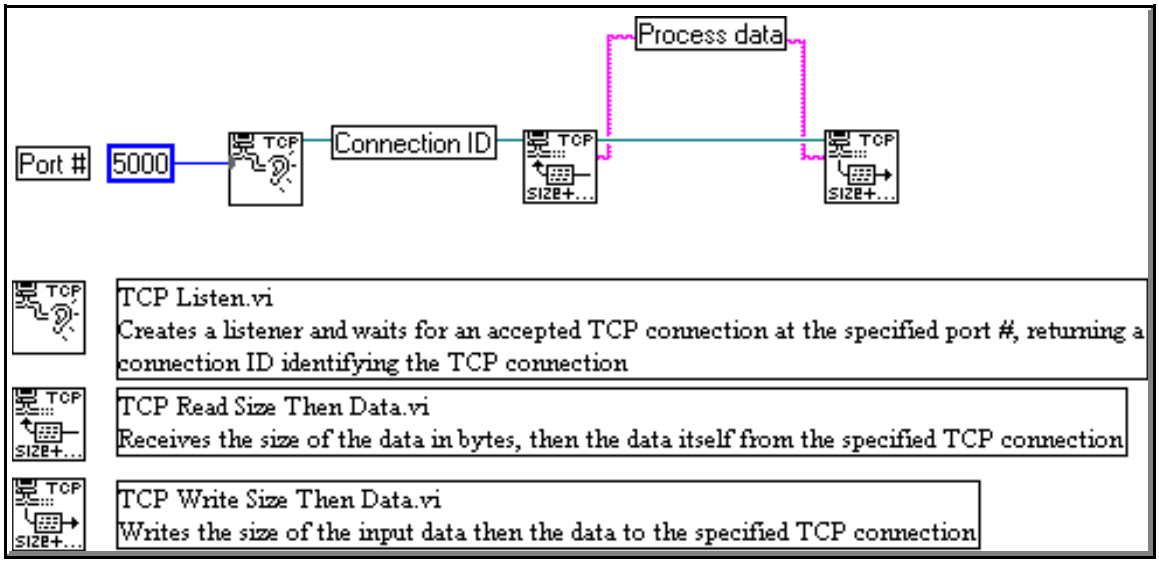
# MACSIM's structure



# CLIENT

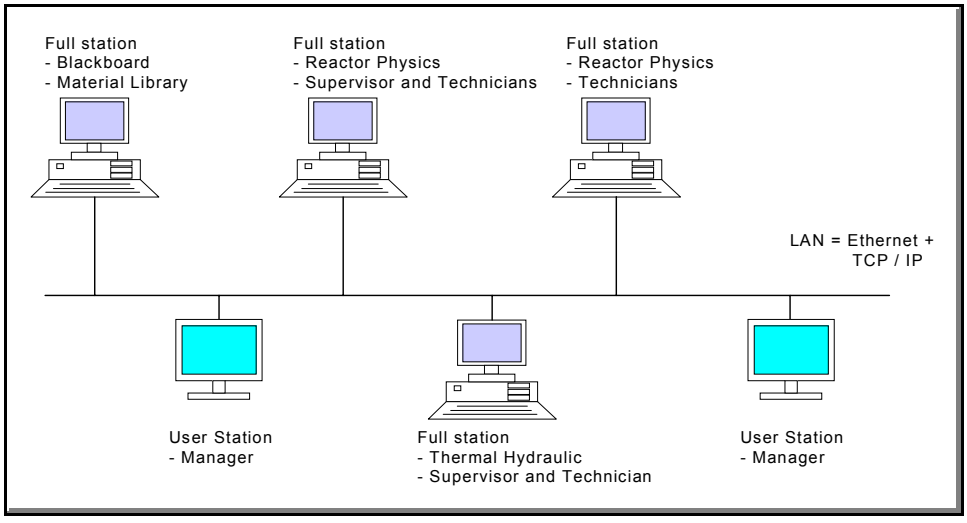



# SERVER



# MACSIM's Present status

- Reactor physics
  - Flux solver
  - Controller
  - Transient depletion
  - Transient poisonning
- Thermal hydraulics



# Conclusion

- MACSIM shows **potential** for the coupling of simulation codes
  - LabVIEW built-in utilities in conjunction with the use of the blackboard **simplify** codes interactions
  - Modular structure makes code very **flexible** and **upgradable** to real time