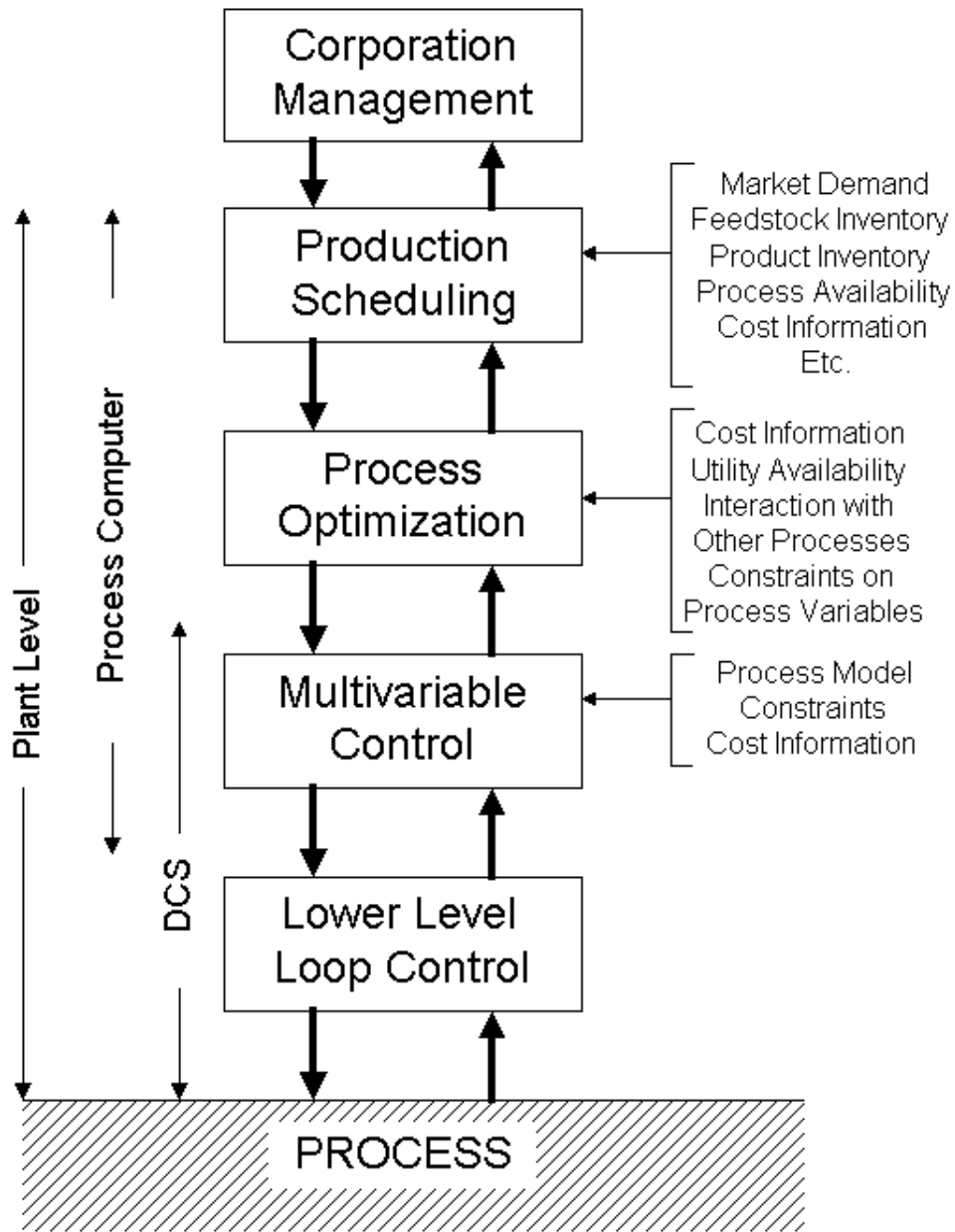


3.4 CURRENT TRENDS

3.4.1 COMPUTER INTEGRATED PROCESS MANAGEMENT



3.4.2 MODEL-BASED APPROACHES

- At every level of the previous CIM hierarchy possibly except low-level loop control and corporation management, *process models* play very important roles.

- **Multivariable Control**
 - In multivariable control, modelless approaches such as decentralized PID has limitations in achievable performance. *Model-based approach* is indeed mandatory.

 - In SISO control, too, controllers designed based on a process model always shows better performance than modelless ones. Especially, for processes with long time-delay and/or inverse response, performance of PID control appears very poor.

 - In industries, economically optimal operating conditions are frequently given at intersections of process constraints. For this reason, constraint handling is an important part of multivariable control. This problem is most effectively handled with model-based approaches.

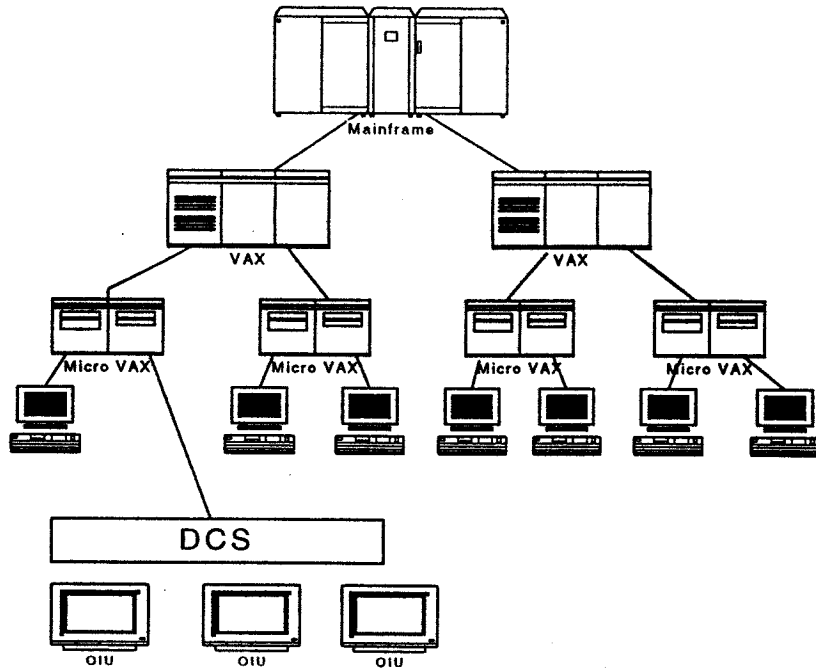
 - *Model Predictive Control* is a convenient and effective vehicle to embrace all the above requirements in a single framework and has now become the industrial standard for multivariable control.

- **On-line Optimization**

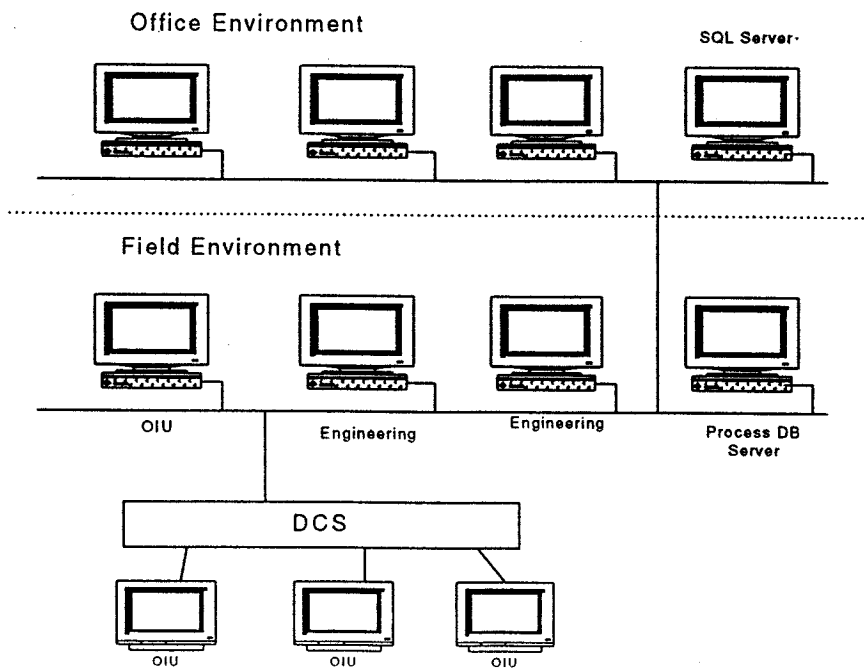
- Dependable on-line process optimization has been a long-cherished desire in the process industries.
- Success of on-line optimization definitely relies on the quality of the process model.
- Thanks to recent advances in system identification and parameter estimation techniques, creation of a reliable model tuned to an industrial process is now much easier than before. As a consequence, on-line optimization is becoming a practical gear which makes existing processes more profitable.

3.4.3 COMPUTING ENVIRONMENT

Past : vertical hierchy

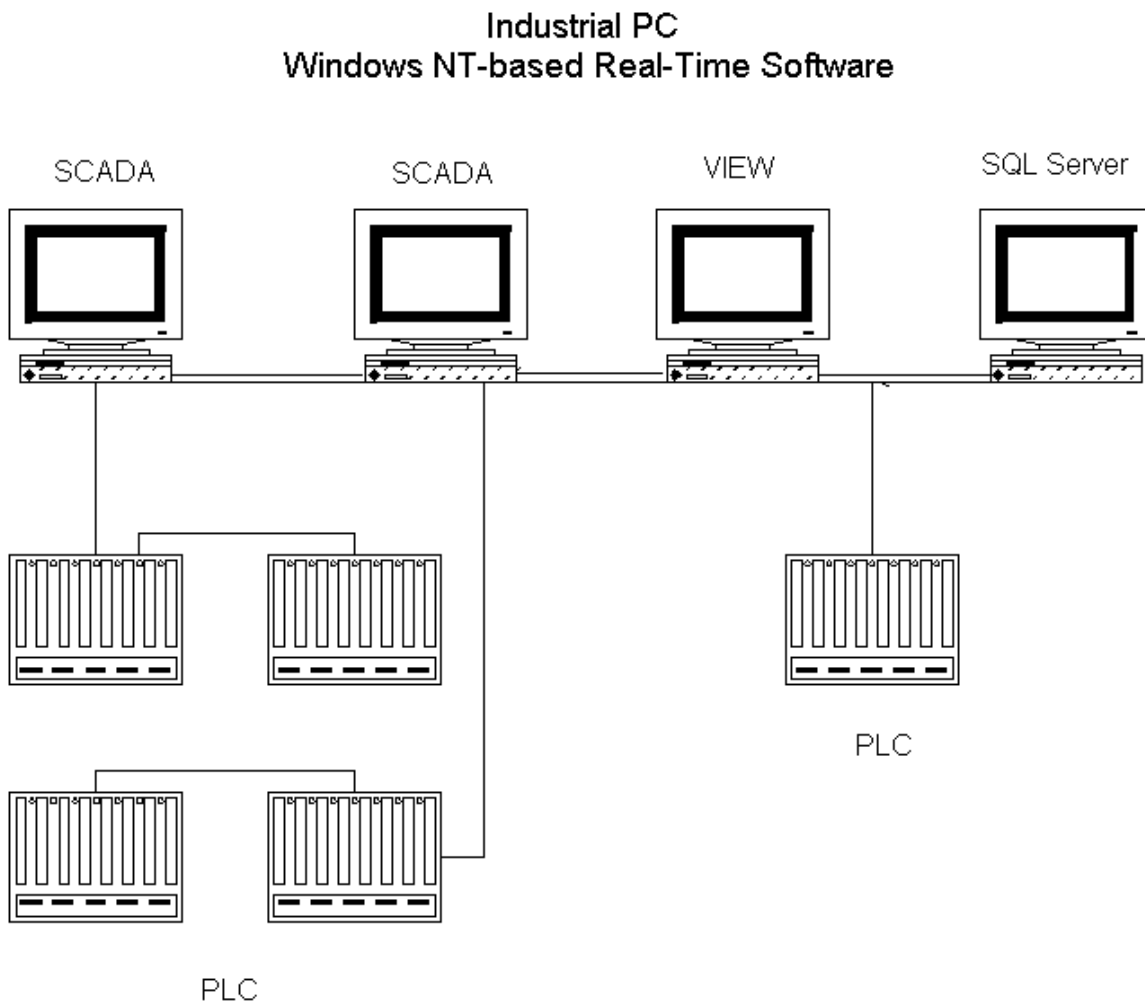


Present : Networked server-client



3.4.4 COMPUTER CONTROL SYSTEM

- From proprietary systems to open architected systems
- Popularization of PC-PLC systems



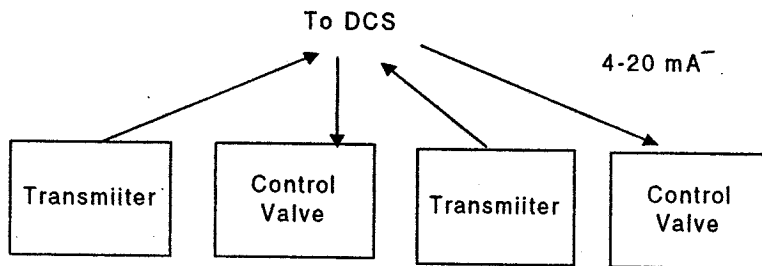
3.4.5 SMART INSTRUMENT AND FIELD BUS

Smart Transmitter

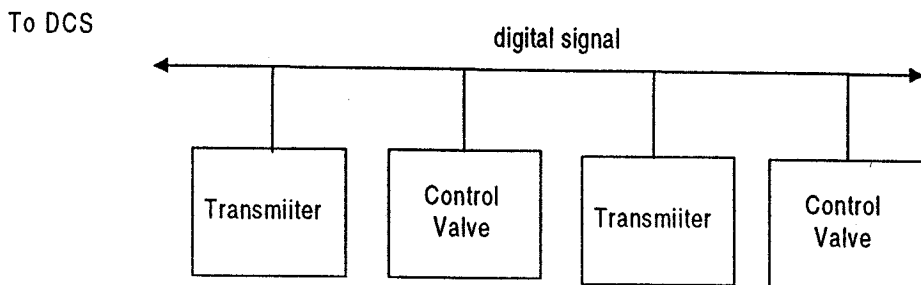
- Includes a CPU and additional ancillary sensors
- Self-diagnosis, self-calibration, linearization, enhanced accuracy by digital signal processing

Field bus

Conventional Field Wiring



Concept of Field Bus



- With the field-bus
 - Wiring cost can be greatly reduced.
 - dialog between the field instruments and the computer control system is possible.