Lecture 2C
Implementation of Control
DCS and Smart Instrumentation

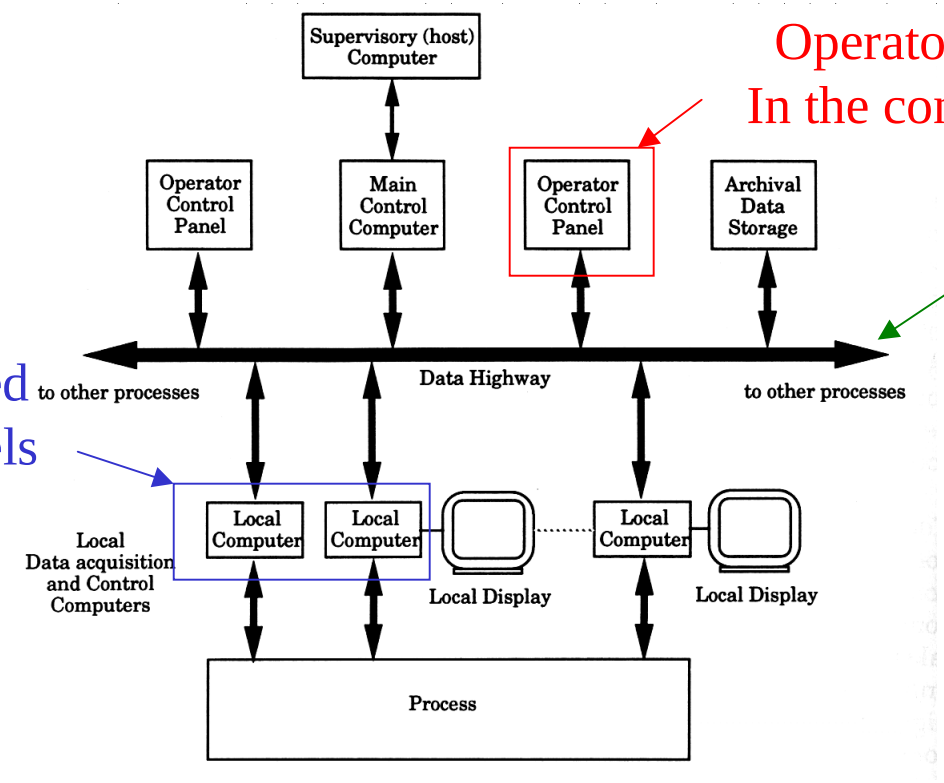
CHE4400

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Distributed Control System (DCS)

- Many local control units connected with each other and other workstations / mainframes through network.

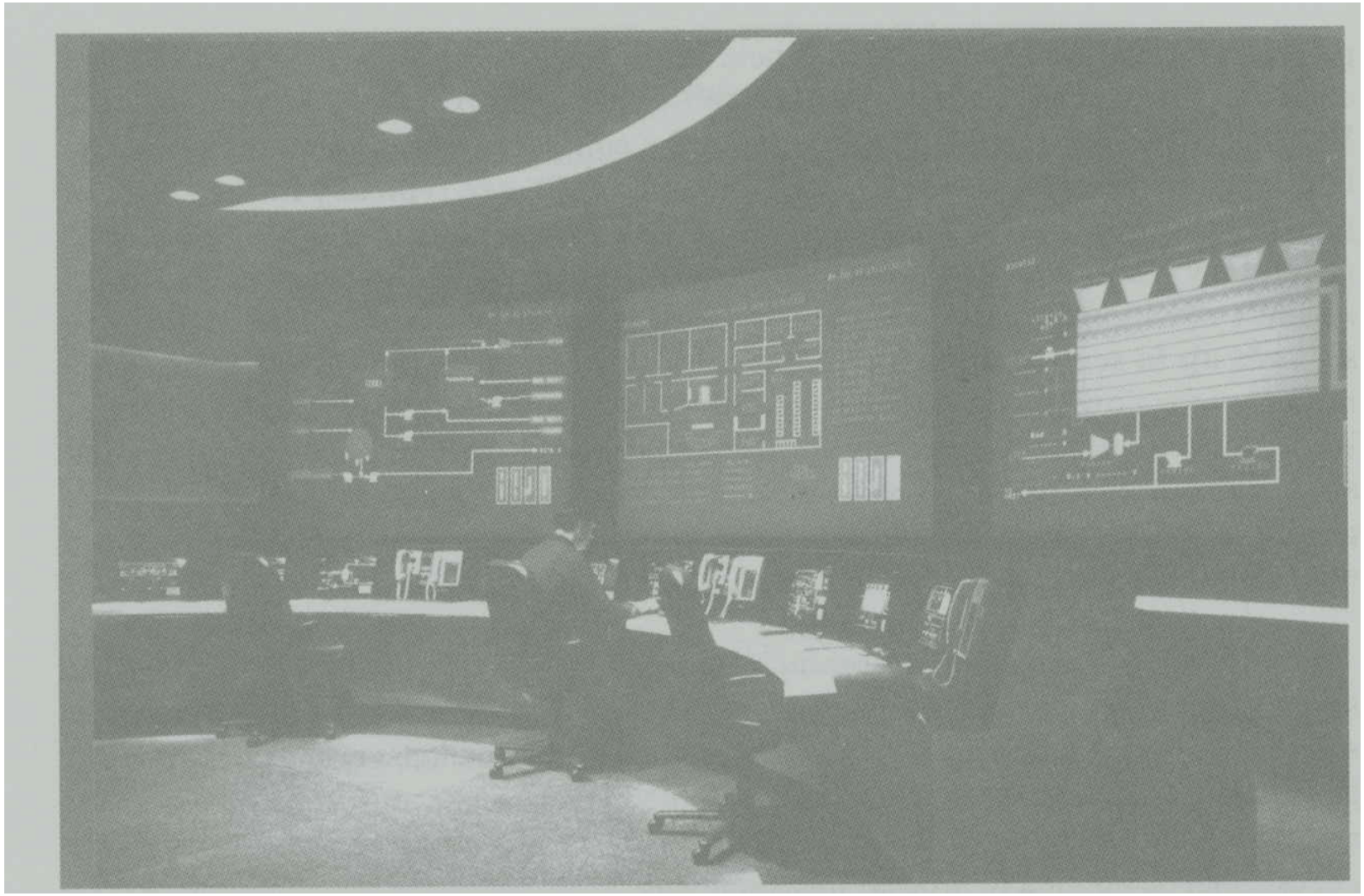


Operator display
In the control room

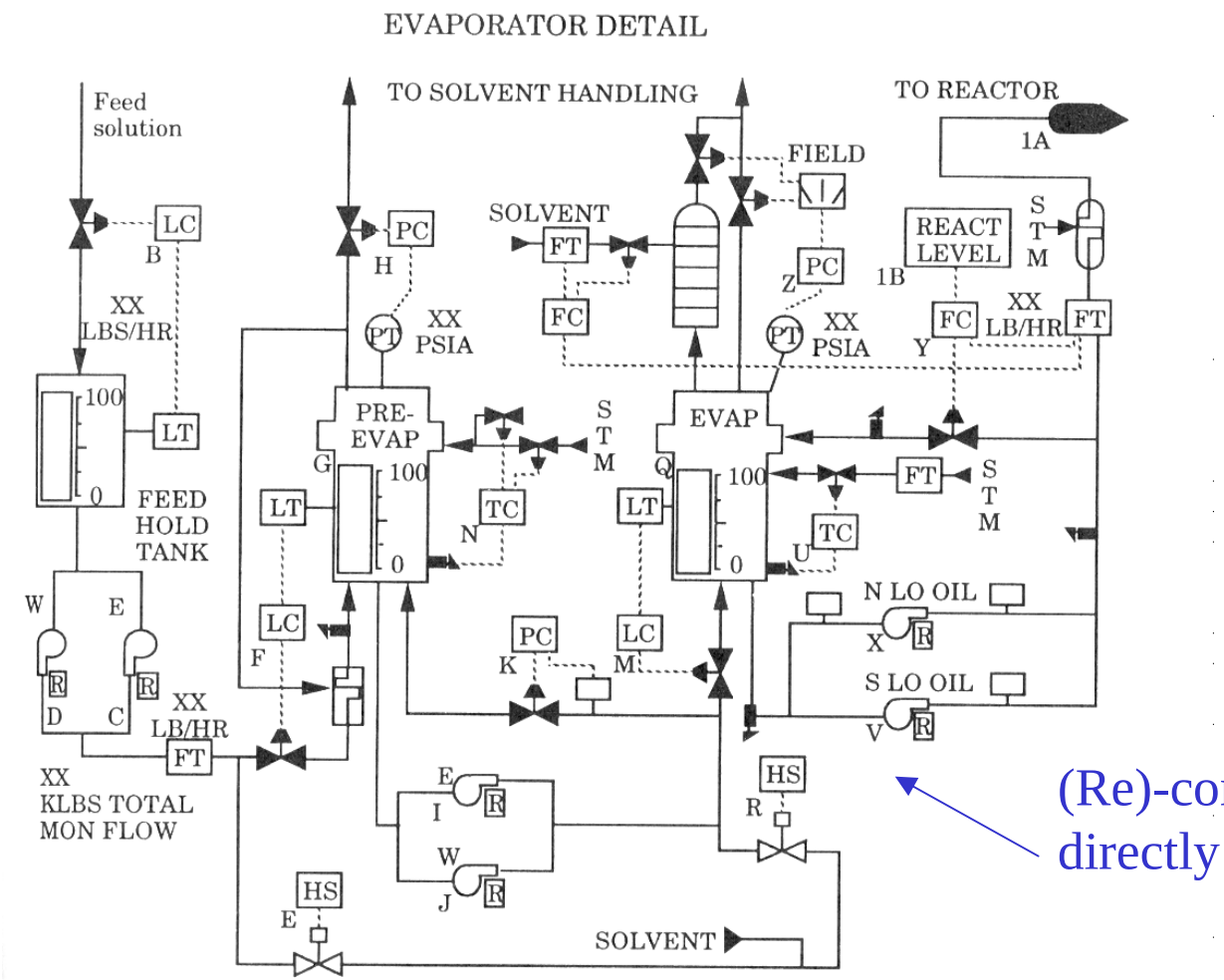
Various I/O readings are floating around with ID tags.

Each unit is equipped w/ many I/O channels

Typical Control Room



Typical Operator Display



Touch the screen to get the reading on any specification location.

(Re)-configure controllers directly from the screen.

More on DCS

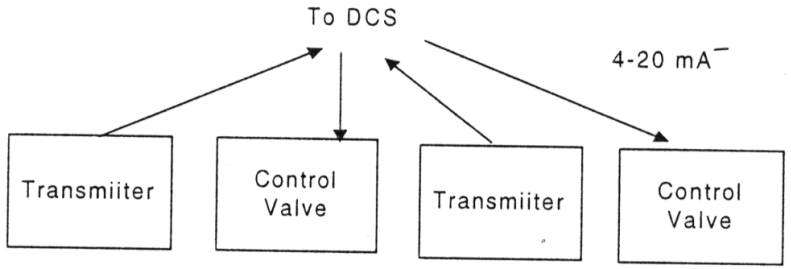
- DCS vs. Single Mainframe
  - Robust to failures
  - Can grow with the need.
- Commercial Vendors
  - Honeywell, Bailey, Foxboro, etc.
  - DCSs are becoming more compact and PC-based.
  - Sensible investment for plants that require hundreds or thousands of control loops.
- Functions
  - Programmable Logic Control (PLC)
  - Basic control algorithms (e.g, PID)
  - Easy networking for integration with higher-level workstations performing data storage, process optimization, and advanced control calculation.

Smart Instruments

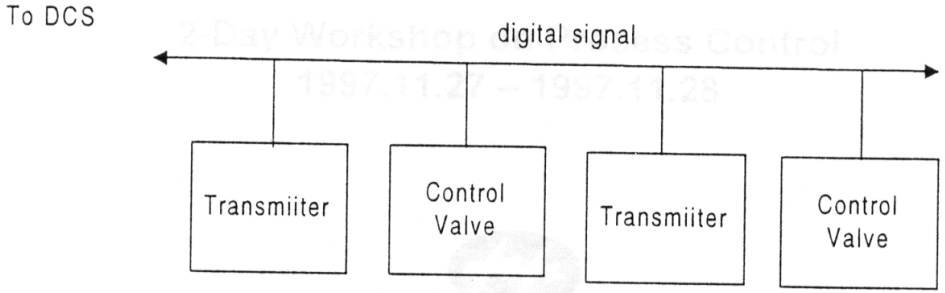
- Smart Sensors
  - Includes a CPU and ancillary sensors
  - Self-diagnosis, self-calibration, linearization
  - Enhanced accuracy by digital signal processing
- Smart Actuators
  - Includes a CPU
  - Self-diagnosis
  - Can work with digital signals (using stepping motors or local pressure source) for better precision

Field Bus

Conventional Field Wiring



Concept of Field Bus



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