Importance of Computer in Chemical Industries

Area Covered

- Uses of Computer in chemical industries

- ● DCS (distributed control system)
  - Fertilizer
  - Water Treatment
  - Chemical Plant

- ● Chromatography

Importance of Computer in chemical industries

- **Computer-Aided Chemical Engineering is being done since 1950s to the present state in which virtually all chemical engineering is computer-aided.**

- **Computer-aids are used at every stage from deciding what chemical species to make, through the conceptual design of the processes, the detailed design, the on-line control, optimization and up to the decommissioning. Computer-aids are important for assessing and minimizing environmental impacts and hazards.**

- There are several areas where Computerized systems are being used in Chemical Industries. Some of them are:
- DCS (distributed control system)
  - ○ Fertilizer
  - ○ Water Treatment
  - ○ Chemical Plant

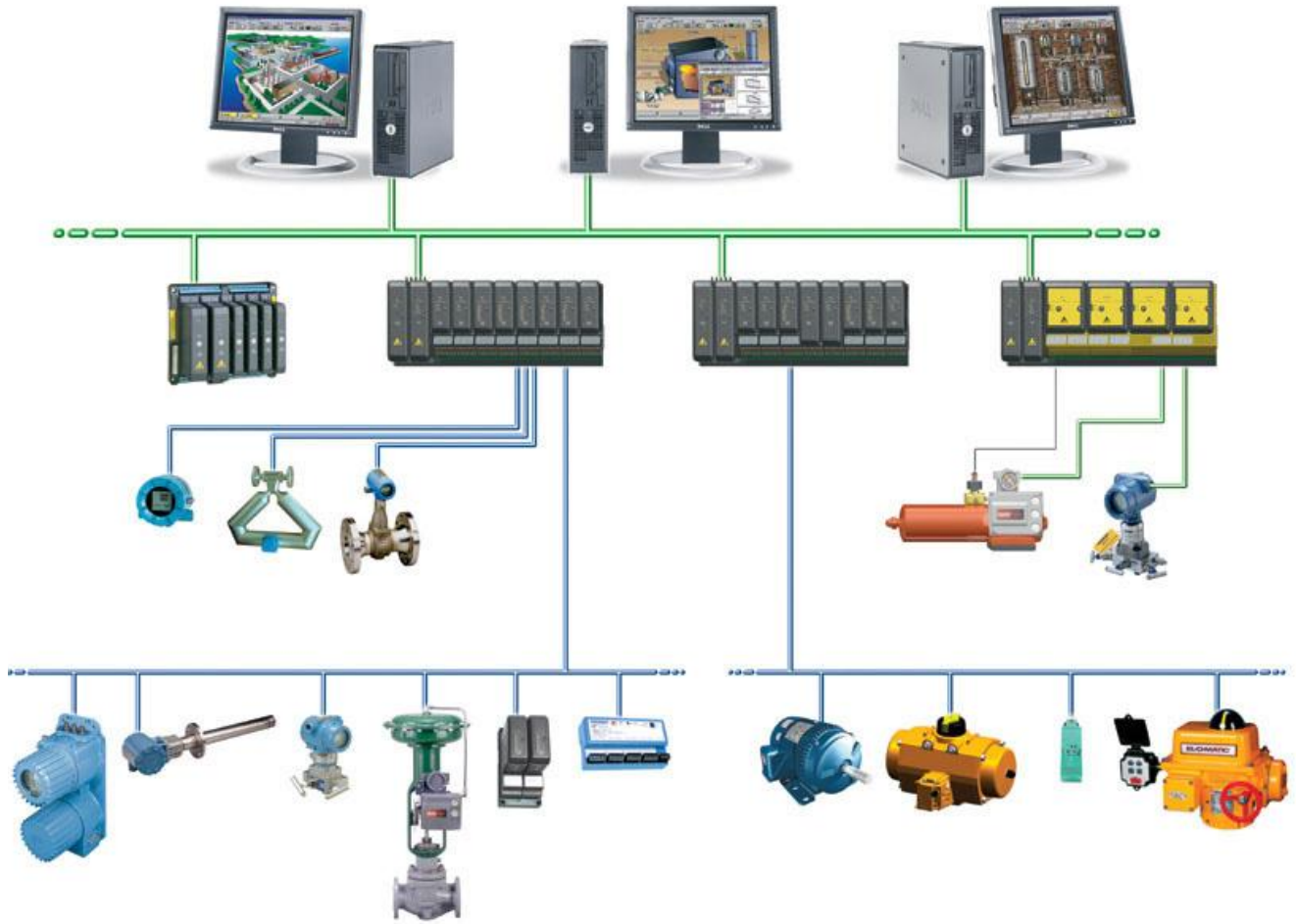
Some others areas are :

- Chemical plants
- Petrochemical (oil) and refineries
- Pulp and paper mills
- Boiler controls and power plant systems
- Nuclear power plants
- Environmental control systems
- Water management systems
- Water treatment plants
- Sewage treatment plants
- Food and food processing
- Agrochemical and fertilizer
- Metal and mines
- Automobile manufacturing
- Metallurgical process plants
- Pharmaceutical manufacturing
- Sugar refining plants
- Agriculture applications

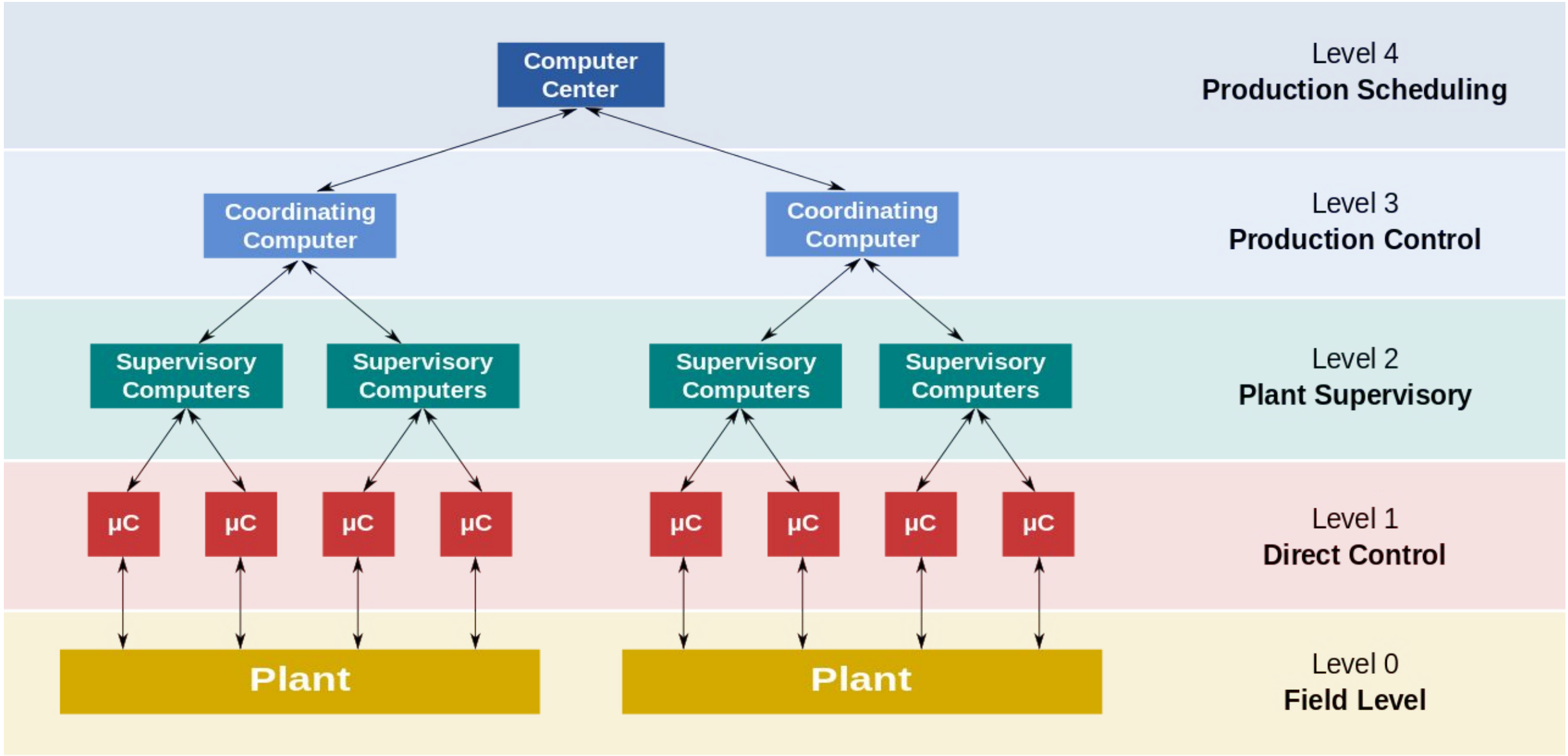
DCS (distributed control system)

- Distributed control systems (DCSs) are computer-software packages communicating with control hardware and providing a centralized human–machine interface (HMI) for controlled equipment.
- It is a central computer that autonomously coordinates the many subsystems (such as sensors and controllers) located around a plant in real-time.
- DCS are particularly important **for controlling complex processes or for large continuous manufacturing plants where top-down control and coordination is vital for efficiency**.

DCS (distributed control system)



DCS (distributed control system)



Chromatography

- Chromatography is **a process for separating components of a mixture**
- **Now a days computer aided systems are being used for chromatography.** Chromatography is used to separate a mixture of sample causing them to separate. Using a computer to analyze the time taken for a compound to be detected, one can know what is the compound. This can be used for detecting unknown mixture found in crime scene, mapping DNA (you can google “DNA chromatography), and so on.

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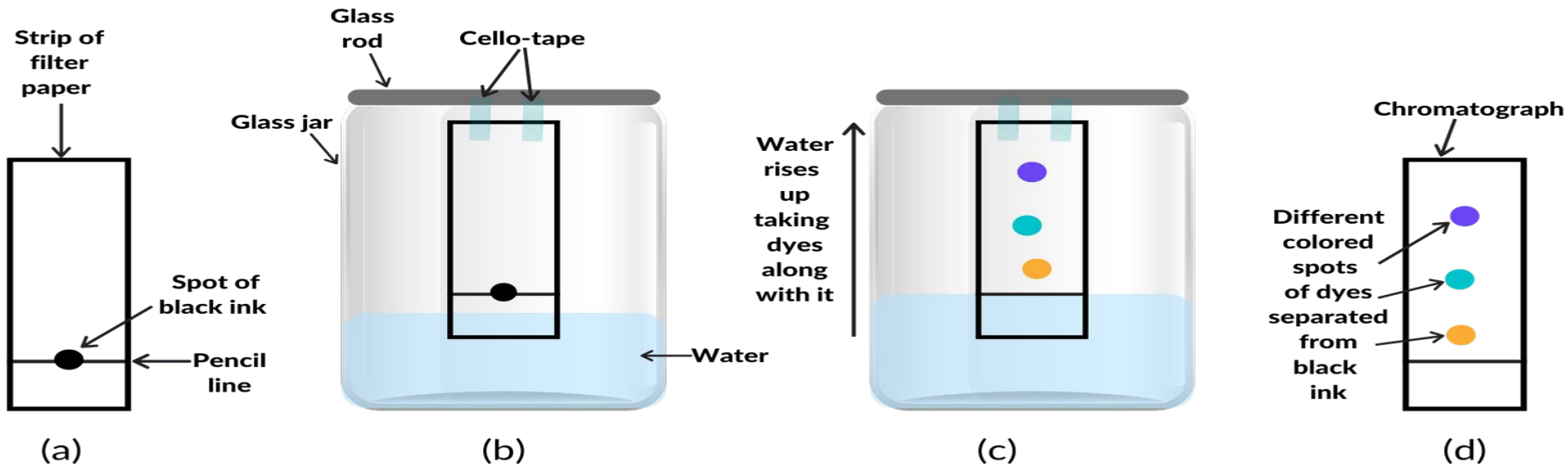
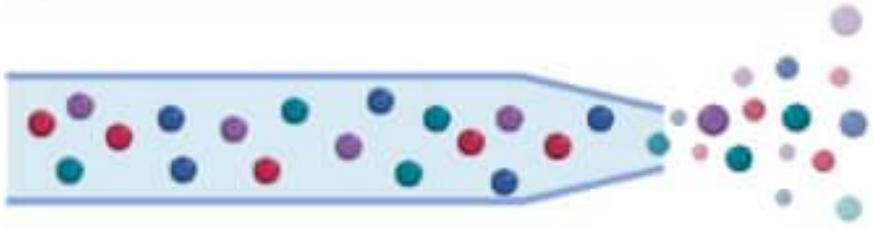
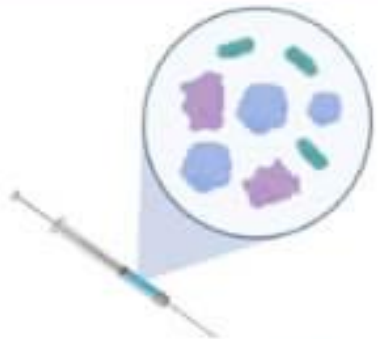
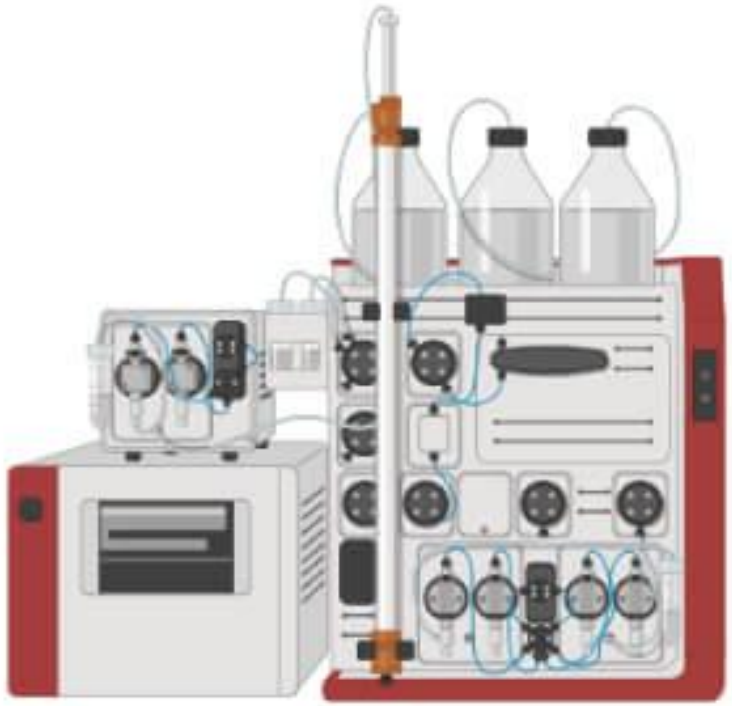
Chromatography

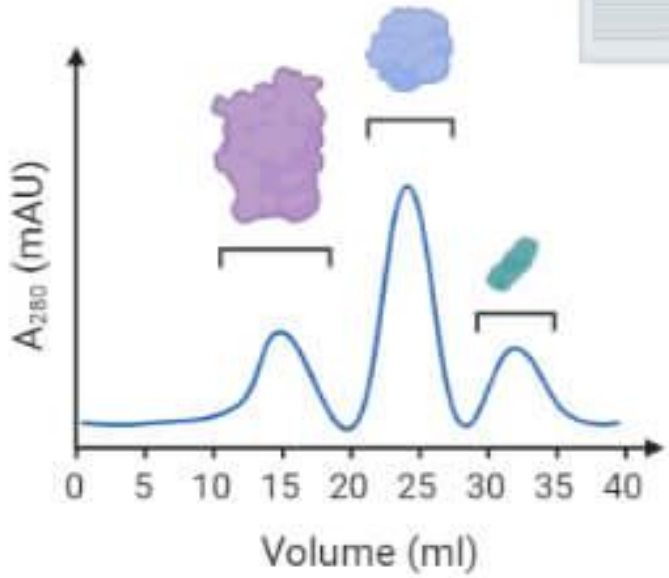


Types of Chromatography









Uses of Chromatography

- Let's start with some areas where it is used more often. (Not limited to)
- **Pharmaceutical industry**: In this field,(Includes Cosmetics and Herbal products too) it is mainly used to assertion purity of drugs. Identify impurities and develop chromatographic methods to quantify impurities.
- **Food and beverage industry:** In this industry, it is used to majorly identify contaminants like pesticides content in beverages or heavy metal contents in water of food stuffs.
- **Forensic Labs:** Here, chromatography is used to determine which fluids and compounds are present in human body after death or analyze blood samples to know whether he was poisoned to death etc.
- **Diagnostic Labs:** In this Labs, we determine amount of drug present in blood, urine samples etc. You would be aware of dope tests where players are tested for banned steroids.

“Tell me and I forget, teach me and I may remember, involve me and I learn.”
— Benjamin Franklin