

## Assignment – 02

### REAL WORLD APPLICATION FOR PARALLEL COMPUTING :

#### \*.Video Processing and Streaming

Video processing and streaming technologies rely heavily on parallel computing to handle large volumes of data quickly and efficiently. Videos are made up of thousands of frames (images), and processing each frame such as compressing, filtering, or enhancing requires significant computing power. Instead of processing frames one by one (serial computing), parallel computing splits the workload across multiple processors or cores, allowing simultaneous processing of different parts of a video or multiple video streams. For example, a video encoder like H.264 or HEVC (example- Netflix, YouTube, etc.) breaks the video into blocks and processes them in parallel. Similarly, during real-time video streaming, parallel computing helps encode, transmit, and decode video data at high speed to ensure smooth playback with minimal buffering.

On the user end, devices with multi-core CPUs and GPUs use parallel tasks to decode and display high-resolution videos (like 4K or 8K) efficiently. On the server side, streaming platforms use data centers equipped with thousands of processors working in parallel to handle millions of video streams simultaneously.

\*.Speed: Parallelism drastically reduces processing time for video editing, rendering, or live streaming.

\*.Efficiency: Uses resources better, especially for high-definition (HD) or ultra-HD content.

\*.Scalability: Supports many users at once across platforms.

## REAL WORLD APPLICATION FOR NETWORKED SYSTEMS:

### \*.Healthcare

Networked systems refer to the use of interconnected computers, devices, and software that allow medical professionals to access, share, and store data efficiently and securely. These systems are essential in modern healthcare because they improve patient care, speed up processes, reduce human error, and enhance communication.

#### 1. Electronic Health Records (EHR)

One of the most critical uses of networked systems in healthcare is the management of Electronic Health Records (EHRs). EHRs are digital versions of patients' medical history, including test results, prescriptions, and past treatments. These records are stored in centralized servers and can be accessed by doctors, nurses, and pharmacists across hospitals, clinics, and even mobile health apps. This helps in providing accurate, timely, and consistent care.

For example, if a patient visits an emergency room in another city, doctors can instantly access their medical history, allergies, and medications through the network. This can save lives in critical situations.

#### 2. Medical Device Connectivity

Many modern medical devices—like heart rate monitors, ventilators, or infusion pumps—are connected to hospital networks. These devices automatically send real-time data to a central system where it is monitored and recorded. Alerts can be triggered if a patient's condition becomes critical.

#### 3. Telemedicine and Remote Consultations

Telemedicine platforms use networked systems to connect doctors and patients remotely via video calls, messaging, and file sharing. This became especially important during the COVID-19 pandemic, when physical visits were limited. Patients can now receive diagnoses, prescriptions, and follow-up care from their homes. Telemedicine increases accessibility to healthcare, especially for people in remote or rural areas.

#### 4. Pharmacy and Laboratory Integration

Hospitals often connect their pharmacy and laboratory systems to the central network. When a doctor prescribes medication or orders a test, it is instantly sent to the relevant department. Test results and prescriptions are uploaded directly to the patient's EHR, making the process faster and more efficient. This reduces paperwork, cuts down on waiting times, and minimizes errors in drug administration or lab reports.

#### 5. Data Security and Compliance

Healthcare data is highly sensitive. Networked systems use encryption, firewalls, and secure authentication methods to protect patient data. Regulations like HIPAA (in the U.S.) require healthcare providers to follow strict guidelines for storing and sharing patient information securely.

- \*.Faster Response Times: Real-time data sharing helps in emergencies and speeds up routine processes.

- \*.Better Communication: Staff can communicate more efficiently across departments and even between hospitals.

- \*.Reduced Errors: Automation and digital records reduce mistakes in medications, diagnostics, and documentation.

- \*.Cost Savings: Reduces paperwork, manual work, and unnecessary hospital visits.