1.PARALLEL SYSTEMS:

APPLICATION: WEATHER FORECASTING

How Parallel Systems Are Used:

Weather forecasting relies on complex simulations of the Earth's atmosphere. These simulations involve solving millions of mathematical equations that represent weather conditions (like temperature, pressure, wind) over time.

To handle this enormous task:

Supercomputers with thousands of CPUs or GPUs work in parallel to divide the simulation into smaller parts (e.g., dividing the Earth's surface into grids).

Each processor handles a section of the grid simultaneously, calculating data for short time steps.

Technologies Involved:

High Performance Computing (HPC) clusters

Parallel programming models like MPI (Message Passing Interface) or OpenMP

Vector processors and multi-core CPUs

Why It's Important:

Produces accurate and timely forecasts, which are critical for disaster preparedness (like hurricanes or floods).

Increases resolution and range of forecasts without sacrificing performance.

Reduces time taken from days to hours or even minutes to generate reliable results.

2.NETWORKED SYSTEMS

APPLICATION: ONLINE BANKING SYSTEMS

How Networked Systems Are Used:

Online banking relies on networked systems to provide secure, real-time access to financial services from anywhere in the world.

When you log in to your bank account, your device connects over the internet to the bank's centralized servers.

Every transaction—like checking balance, transferring money, or paying bills—is sent as a network request to the server.

The system coordinates with other financial institutions, databases, and services over a network to complete transactions.

Technologies Involved:

Client-server architecture

Secure protocols like HTTPS, SSL/TLS for encrypted communication

APIs for inter-bank communication (e.g., for UPI, SWIFT)

Load balancers and distributed databases for high availability

Why It's Important:

Enables 24/7 access to banking services

Supports millions of users concurrently

Provides real-time updates to account balances and transactions

Critical for security, scalability, and convenience