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PDC

Assignment # 3

Types of Virtualizations in Parallel and Distributed computing on the base of what why when and how.

1. **Hardware Virtualization:**
    - **What:** Imagine splitting a single computer into multiple virtual computers, each running its own operating system.
    - **Why:** It helps make the most out of a powerful computer by running different things on it, all isolated from one another.
    - **When:** Useful when you want to run multiple operating systems on a single machine without them interfering with each other.
    - **How:** Achieved using special software that manages and shares the physical resources of the computer.
2. **Operating System Virtualization (Containerization):**
    - **What:** Think of it like mini-computers within your computer, all sharing the same basic system but running different programs.
    - **Why:** It's a lightweight way to run applications without the need for a full operating system for each one.
    - **When:** Handy when you need to quickly deploy and manage applications, especially in scenarios like modern microservices.
    - **How:** Done using tools that create and manage these mini-computers, making it efficient and fast.
3. **Network Virtualization:**
    - **What:** Picture creating multiple pretend networks on the same physical network, helping things stay organized.
    - **Why:** It gives more flexibility and control over how different parts of a network interact.

- **When:** Useful in large-scale setups like data centers or cloud computing, where lots of different networks need to coexist.
- **How:** Implemented through smart software that organizes and manages these virtual networks.

4. **Storage Virtualization:**
    - **What:** Imagine combining all your storage into a magical pool that can be easily divided and shared as needed.
    - **Why:** It simplifies managing where you store things and adds handy features like copying or moving data around effortlessly.
    - **When:** Helpful when dealing with a ton of data, especially in big storage setups or cloud services.
    - **How:** Achieved through software that creates this flexible, virtual storage space.
5. **Memory Virtualization:**
    - **What:** Think of it like having a shared pool of memory that different applications can dip into as needed.
    - **Why:** It ensures that memory is used efficiently, allowing for better handling of many different tasks at once.
    - **When:** Useful in situations where different programs have varying memory needs, like in cloud computing.
    - **How:** Managed through clever techniques that let different parts of a computer share and use memory intelligently.