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Questions for Assessment

Q. Main Differences Between Unix and Windows Operating Systems

1. **Kernel Structure**

   o **Unix:** Has a monolithic kernel where all system functions run in one block. It's fast but a single fault can affect everything.

   o **Windows:** Uses a hybrid kernel combining small and large modules, offering better flexibility and stability.

2. **User Interface**

   o **Unix:** Mostly uses a text-based command-line interface. GUIs are available (like GNOME, KDE) but not the main focus. Best suited for skilled users.

   o **Windows:** Completely GUI-based, using icons and menus. It's more user-friendly, especially for casual users.

3. **File System**

   o **Unix:** Uses file systems like ext4 or UFS. It's case-sensitive and treats all items, even devices, as files.

   o **Windows:** Uses file systems like NTFS, FAT32. It's not case-sensitive and hardware isn't treated as files.

Q. What Are the Kernel and Shell in Unix?

- **Kernel:**
  The core of the Unix system. It manages system resources such as memory, CPU, and devices, and acts as a bridge between software and hardware.

- **Shell:**
  A program that allows users to interact with the system through commands. It takes input from the user and sends it to the kernel for execution.

Common Unix Shells:

- **Bash:** Most widely used in Linux systems.

- **sh:** The original Unix shell.

- **csh:** Has a syntax similar to the C programming language.

- **tcsh:** An improved version of csh.

- **zsh:** Advanced features with great customization.

Q. Types of Real-Time Operating Systems (RTOS)

1. **Hard RTOS:**
   - Requires strict timing—missing a deadline can lead to failure.
   - Found in critical systems like pacemakers or airbags.

2. **Soft RTOS:**
   - Timing is important but flexible—some delays are acceptable.
   - Used in areas like video streaming or financial systems.

3. **Firm RTOS (optional):**
   - Deadlines should be met, but occasional misses are allowed if they don't harm performance.

Q. Difference Between Distributed OS and Network OS

- **Distributed Operating System:**
  - Treats multiple connected machines as one system.
  - Resources and control are shared centrally.
  - The distribution is invisible to users.
  - Common in cloud computing setups like MapReduce.

- **Network Operating System:**
  - Each machine runs its own OS but shares some resources.
  - No central control, and users must know where resources are located.
  - Example: Microsoft Windows Network.

Q. Why Are Mobile Operating Systems Designed for Battery and Speed?

1. **Battery Efficiency:** They're optimized to use less power to prolong battery life.

2. **Responsive UI:** Interfaces are made to feel quick and smooth.

3. **Low-Power Hardware:** Designed to run well on limited hardware.

4. **Constant Usage:** Since mobile devices are used throughout the day, the OS balances speed and power use carefully.

Q. Scheduling in GPOS vs. RTOS

Aspect	GPOS (General Purpose OS)	RTOS (Real-Time OS)
Goal	Fairness, multitasking	Meeting deadlines, predictable
Scheduling	Time-sharing methods	Priority and deadline-based
Task Priority	Based on user-defined levels	Based on time sensitivity
Context Switching	More frequent and complex	Minimal and optimized
Latency	Higher and less consistent	Very low and predictable
Interrupts	May be delayed	Handled immediately
Task Type	Interactive, background tasks	Critical, time-sensitive tasks

Summary:
GPOS works best for general tasks and multitasking, while RTOS is ideal for situations where time and deadlines are critical.

Q. Practical Uses of RTOS and Mobile Operating Systems

- **RTOS is commonly used in:**

    1. **Embedded systems:** Smart appliances, industrial machines

    2. **Automotive:** ABS, airbag systems

    3. **Medical devices:** Pacemakers, ventilators

    4. **Robotics:** Real-time control of sensors and motors

    5. **Aerospace and defense:** Drones, missile systems

    6. **Telecommunication:** Routers and signal processing

- **Mobile OS is used in:**

  1. **Smartphones and tablets:** Android, iOS

  2. **Wearables:** Smartwatches using Wear OS, watchOS

  3. **Smart home devices:** Echo, Google Nest

  4. **Mobile gaming:** Games that rely on touch and motion