**Topic: Running of applications**

Reading Time: 15 mins

**·        Note\* Highlight important/core points while reading**

·        Read the content and write the answers given in the document in your words to get a solid grip on the topic.

**Running of Applications**

Running an application refers to the process of executing software programs on a computer. The operating system (OS) is primarily responsible for managing the execution of applications, ensuring that they have the resources and environment necessary to function properly.

**Categories of Running Applications**

1. **Application Launch**

* **Description**: The OS starts the application by loading its executable file from storage into memory.
* **Working**:
  + The user initiates the application by clicking on an icon or entering a command.
  + The OS allocates memory and resources to the application and begins execution.

2. **Resource Allocation**

* **Description**: The OS ensures the application has access to required resources, such as CPU time, memory, and input/output devices.
* **Working**:
  + The CPU executes the program instructions in a sequential or scheduled manner.
  + The OS allocates RAM and manages any virtual memory if required.

3. **Execution of Code**

* **Description**: The OS ensures the instructions of the application are processed by the CPU.
* **Working**:
  + The application’s code is executed in cycles (fetch, decode, execute).
  + If the application makes system calls (e.g., to save a file), the OS handles these requests.

4. **Multitasking Support**

* **Description**: The OS enables multiple applications to run simultaneously.
* **Working**:
  + The OS schedules processes so applications share the CPU.
  + It uses preemptive multitasking to switch between active applications efficiently.

5. **Application Termination**

* **Description**: When an application is closed, the OS releases its resources and clears memory.
* **Working**:
  + The application signals its termination to the OS.
  + The OS deallocates memory and updates system resources for other tasks.

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| **Category** | **Description** | **Example** |
| Application Launch | Loading the application into memory for execution. | Opening a web browser by clicking its icon. |
| Resource Allocation | Assigning CPU, memory, and I/O resources to the app. | Allocating RAM for an image editor. |
| Execution of Code | Running the application’s instructions on the CPU. | Processing a document in a word processor. |
| Multitasking Support | Running multiple applications simultaneously. | Streaming music while browsing the web. |
| Application Termination | Releasing resources when an application is closed. | Closing a spreadsheet program. |

### ****A-Rated Questions/Answers By Examiner****

**Q1**: **What is the role of the operating system during the launch of an application?**

**Answer**: The operating system loads the application into memory, allocates resources, and begins execution of the program.

**Q2**: **How does the OS ensure that multiple applications can run simultaneously?**

**Answer**: The OS uses multitasking, where it schedules and switches between tasks, ensuring each application shares CPU time effectively.

**Q3**: **What happens when an application is terminated?**

**Answer**: The OS releases the resources (memory, CPU time) allocated to the application and makes them available for other tasks.

**Q4**: **Why is resource allocation important when running applications?**

**Answer**: Resource allocation ensures that each application has the necessary CPU, memory, and input/output resources to function properly.

**Q5**: **What happens if an application requests more memory than is physically available?**

**Answer**: The OS uses virtual memory to allocate additional space, swapping data between RAM and storage as needed.

### Write your Answers on your Notebook and Verify it on Next Screen

**Q6:** **How does the OS handle system calls made by an application during execution?**

**Q7:** **What is the significance of preemptive multitasking in running applications?**

**Q8:** **Why is memory deallocation important during application termination?**

**Q9:** **How does the OS prioritize applications when allocating resources?**

**Q10:** **What challenges might arise if the OS fails to manage resource allocation properly?**

**6. Answer:** The OS processes system calls by interacting with hardware or managing resources (e.g., saving a file), ensuring the application's requests are executed securely and efficiently.

**7. Answer:** Preemptive multitasking ensures the OS can interrupt an active application to allocate CPU time to another, enabling efficient multitasking and responsiveness.

**8. Answer:** Memory deallocation prevents memory leaks by releasing RAM occupied by the application, making it available for other processes and maintaining system performance.

**9. Answer:** The OS prioritizes applications based on factors like user-defined priorities, application requirements, and system policies, ensuring critical applications receive necessary resources first.

**10. Answer:** Poor resource management can lead to issues like system slowdowns, application crashes, or the inability to run multiple applications effectively.